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Volume VIII
Part 10

INTEGRATED INFORMATION
SUPPORT SYSTEM (IISS)
Volume VIII - User Interface Subsystem
Part 10 - Virtual Terminal Product Specification

General Electric Company
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One River Road
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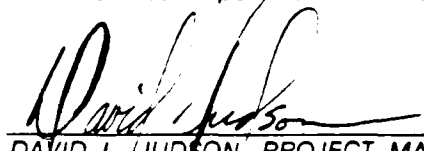WRIGHT-PATTERSON AFB, OH 45433-6533

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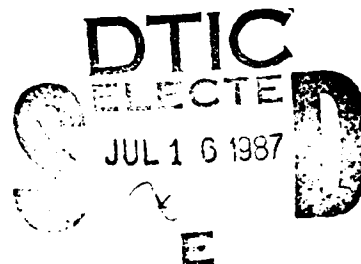
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This technical report has been reviewed and is approved for publication.

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The computer software contained herein are theoretical and/or references that in no way reflect Air Force-owned or -developed computer software.

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19. ABSTRACT (Continue on reverse if necessary and identify by block number)

This specification established the detailed design of a computer program identified as the Virtual Terminal (VT). One of the objectives of the IISS test bed is to allow applications to be run from a wide variety of terminals. Instead of the application programmer having to worry about what commands to send to which type of terminal to perform what functions, he just uses commands for the VT. The VT is defined just like a real terminal; it has a set of functions which it can perform, a set of attributes that it supports, a set of commands for invoking the functions and modes of operation.

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PREFACE

This product specification covers the work performed under Air Force Contract F33615-80-C-5155 (ICAM Project 6201). This contract is sponsored by the Materials Laboratory, Air Force Systems Command, Wright-Patterson Air Force Base, Ohio. It was administered under the technical direction of Mr. Gerald C. Shumaker, ICAM Program Manager, Manufacturing Technology Division, through Project Manager, Mr. David Judson. The Prime Contractor was Production Resources Consulting of the General Electric Company, Schenectady, New York, under the direction of Mr. Alan Rubenstein. The General Electric Project Manager was Mr. Myron Hurlbut of Industrial Automation Systems Department, Albany, New York.

Certain work aimed at improving Test Bed Technology has been performed by other contracts with Project 6201 performing integrating functions. This work consisted of enhancements to Test Bed software and establishment and operation of Test Bed hardware and communications for developers and other users. Documentation relating to the Test Bed from all of these contractors and projects have been integrated under Project 6201 for publication and treatment as an integrated set of documents. The particular contributors to each document are noted on the Report Documentation Page (DD1473). A listing and description of the entire project documentation system and how they are related is contained in document FTR620100001, Project Overview.

The subcontractors and their contributing activities were as follows:

TASK 4.2

Subcontractors	Role
Boeing Military Aircraft Company (BMAC)	Reviewer
D. Appleton Company (DACOM)	Responsible for IDEF support, state-of-the-art literature search
General Dynamics/ Ft. Worth	Responsible for factory view function and information models

Subcontractors	Role
Illinois Institute of Technology	Responsible for factory view function research (IITRI) and information models of small and medium-size business
North American Rockwell	Reviewer
Northrop Corporation	Responsible for factory view function and information models
Pritsker and Associates	Responsible for IDEF2 support
SofTech	Responsible for IDEF0 support

TASKS 4.3 - 4.9 (TEST BED)

Subcontractors	Role
Boeing Military Aircraft Company (BMAC)	Responsible for consultation on applications of the technology and on IBM computer technology.
Computer Technology Associates (CTA)	Assisted in the areas of communications systems, system design and integration methodology, and design of the Network Transaction Manager.
Control Data Corporation (CDC)	Responsible for the Common Data Model (CDM) implementation and part of the CDM design (shared with DACOM).
D. Appleton Company (DACOM)	Responsible for the overall CDM Subsystem design integration and test plan, as well as part of the design of the CDM (shared with CDC). DACOM also developed the Integration Methodology and did the schema mappings for the Application Subsystems.

Subcontractors	Role
Digital Equipment Corporation (DEC)	Consulting and support of the performance testing and on DEC software and computer systems operation.
McDonnell Douglas Automation Company (McAuto)	Responsible for the support and enhancements to the Network Transaction Manager Subsystem during 1984/1985 period.
On-Line Software International (OSI)	Responsible for programming the Communications Subsystem on the IBM and for consulting on the IBM.
Rath and Strong Systems Products (RSSP) (In 1985 became McCormack & Dodge)	Responsible for assistance in the implementation and use of the MRP II package (PIOS) that they supplied.
SofTech, Inc.	Responsible for the design and implementation of the Network Transaction Manager (NTM) in 1981/1984 period.
Software Performance Engineering (SPE)	Responsible for directing the work on performance evaluation and analysis.
Structural Dynamics Research Corporation (SDRC)	Responsible for the User Interface and Virtual Terminal Interface Subsystems.

Prime contractors under other projects who have contributed to Test Bed Technology, their contributing activities and responsible projects are as follows:

Contractors	ICAM Project	Contributing Activities
Boeing Military Aircraft Company (BMAC)	1701, 2201, 2202	Enhancements for IBM node use. Technology Transfer to Integrated Sheet Metal Center (ISMC)

Contractors	ICAM Project	Contributing Activities
Control Data Corporation (CDC)	1502, 1701	IISS enhancements to Common Data Model Processor (CDMP)
D. Appleton Company (DACOM)	1502	IISS enhancements to Integration Methodology
General Electric	1502	Operation of the Test Bed and communications equipment.
Hughes Aircraft Company (HAC)	1701	Test Bed enhancements
Structural Dynamics Research Corporation (SDRC)	1502, 1701, 1703	IISS enhancements to User Interface/Virtual Terminal Interface (UI/VTI)
Systran	1502	Test Bed enhancements. Operation of Test Bed.

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FIGURES

SECTION 1

SCOPE

1.1 Identification

This specification establishes the detailed design of a computer program identified as the Virtual Terminal, hereinafter referred to as the VT. The VT is one configuration item of the Integrated Information Support System (IISS) User Interface (UI).

1.2 Functional Summary

One of the objectives of the IISS testbed is to allow applications to be run from a wide variety of terminals. Instead of the application programmer having to worry about what commands to send to which type of terminal to perform what functions, he just uses commands for the Virtual Terminal. The Virtual Terminal is defined just like a real terminal; it has a set of functions which it can perform, a set of attributes that it supports, a set of commands for invoking the functions, and modes of operation.

The VT translates between the Virtual Terminal commands and commands for the particular type of terminal a user has. This process is not as simple as it sounds since no single terminal provides all of the functions and attributes that the Virtual Terminal does. Thus, the Virutal Terminal Interface must simulate missing functions with existing ones.

In addition to supporting real terminals, the VT also performs another function -- interfacing existing applications to the testbed. An existing application sends (and expects to receive) commands for a particular type of terminal. In the testbed these commands are intercepted and sent to the Virtual Terminal which then converts the commands into Virtual Terminal commands, just as if they had been entered from a real terminal. Of couse, it also converts Virtual Terminal commands to the specific terminal commands the application expects to receive. The Virtual Terminal allows an application to be run from a terminal other than the one it was designed for.

SECTION 2

DOCUMENTS

2.1 Reference Documents

[1] Structural Dynamics Research Corporation, Application
     Interface Product Specification, PS 620144700 , 1
     November 1985.

[2] Structural Dynamics Research Corporation, Forms
     Driven Form Editor Product Specification,
     PS 620144402 , 1 November 1985.

[3] Structural Dynamics Research Corporation, Forms
     Language Compiler Product Specification,
     PS 620144401 , 1 November 1985.

[4] Structural Dynamics Research Corporation, Form
     Processor Product Specification, PS 620144200 ,
     1 November 1985.

[5] Structural Dynamics Research Corporation, Rapid
     Application Generator Product Specification,
     PS 620144502 , 1 November 1985.

[6] Structural Dynamics Research Corporation, Report
     Writer Product Specification, PS 620144501 ,
     1 November 1985.

[7] Structural Dynamics Research Corporation, Text
     Editor Product Specification, PS 620144600 ,
     1 November 1985.

[8] Structural Dynamics Research Corporation, User
     Interface Services Product Specification,
     PS 620144100 , 1 November 1985.

[9] Structural Dynamics Research Corporation, Virtual
     Terminal Development Specification, DS 620144300B,
     1 November 1985.

[10] Structural Dynamics Research Corporation, Virtual
     Terminal User Manual, UM 620144300B, 1 November
     1985.

[11] Structural Dynamics Research Corporation, <u>Virtual</u>
<u>Terminal</u> <u>Unit</u> <u>Test</u> <u>Plan</u>, UTP620144300 , 1 November
1985.

2.2 Terms and Abbreviations

<u>American Standard Code for Information Interchange</u>:
(ASCII), the character set defined by ANSI X3.4 and used by most
computer vendors.

<u>Application Interface</u>: (AI), subset of the IISS User
Interface that consists of the callable routines that are linked
with applications that use the Form Processor or Virtual
Terminal. The AI enables applications to be hosted on computers
other than the host of the User Interface.

<u>Application Process</u>: (AP), a cohesive unit of software that
can be initiated as a unit to perform some function or
functions.

<u>Attribute</u>: field characteristic such as blinking,
highlighted, black, etc. and various other combinations.
Background attributes are defined for forms or windows only.
Foreground attributes are defined for items. Attributes may be
permanent, i.e., they remain the same unless changed by the
application program, or they may be temporary, i.e., they remain
in effect until the window is redisplayed.

<u>Communication Services</u>: allows on host interprocess
communication and inter-host communication between the various
Test Bed subsystems.

<u>Computer Program Configuration Item</u>: (CPCI), an aggregation
of computer programs or any of their discrete portions, which
satisfies an end-use function.

<u>Device Drivers</u>: (DD), software modules written to handle
I/O for a specific kind of terminal. The modules map terminal
specific commands and data to a neutral format. Device Drivers
are part of the UI Virtual Terminal.

<u>Extended Binary Coded Decimal Interchange Code</u>: (EBCDIC),
the character set used by a few computer vendors (notably IBM)
instead of ASCII.

<u>Field</u>: two dimensional space on a terminal screen.

Integrated Information Support System: (IISS), a test computing environment used to investigate, demonstrate and test the concepts of information management and information integration in the context of Aerospace Manufacturing. The IISS addresses the problems of integration of data resident on heterogeneous data bases supported by heterogeneous computers interconnected via a Local Area Network.

Logical Device: a conceptual device which to an application is indistinguishable from a physical device and is then mapped to part or all of a physical device.

Network Transaction Manager: (NTM), IISS subsystem that performs the coordination, communication and housekeeping functions required to integrate the Application Processes and System Services resident on the various hosts into a cohesive system.

Operating System: (OS), software supplied with a computer which allows it to supervise its own operations and manage access to hardware facilities such as memory and peripherals.

Physical Device: a hardware terminal.

User Interface: (UI), IISS subsystem that controls the user's terminal and interfaces with the rest of the system. The UI consists of two major subsystems: the User Interface Development System (UIDS) and the User Interface Management System (UIMS).

User Interface Management System: (UIMS), the runtime UI. It consists of the Form Processor, Virtual Terminal, Application Interface, the User Interface Services and the Text Editor.

User Interface Monitor: (UIM), part of the Form Processor that handles messaging between the NTM and the UI. It also provides authorization checks and initiates applications.

User Interface/Virtual Terminal Interface: (UI/VTI), another name for the User Interface.

Virtual Terminal: (VT), subset of the IISS User Interface that performs the interfacing between different terminals and the UI. This is done by defining a specific set of terminal features and protocols which must be supported by the UI software which constitutes the virtual terminal definition. Specific terminals are then mapped against the virtual terminal software by specific software modules written for each type of real terminal supported.

Virtual Terminal Interface: (VTI), the callable interface to the VT.

Window: dynamic area of a terminal screen on which predefined forms may be placed at run time.

Window Manager: a facility which allows the following to be manipulated: size and location of windows, the device on which an application is running, the position of a form within a window. It is part of the Form Processor.

SECTION 3

REQUIREMENTS

3.1 Structural Description

     Figure 3-1 describes the structure of the Virtual Terminal.
The Virtual Terminal consists of some routines that are linked
with the application that uses it (VT Application Monitor) as
well as a process that performs monitoring, window management
activities and translation of VT commands into commands for a
specific device.

```
              +-------------------+
              |   VT Application  |
              |     Monitor       |
              +-------------------+
                        ^
                        |
                        |  VT Commands
                        |   and Data
                        v
              +-------------------+
              |     Monitor       |
              +-------------------+
              |  Window Manager   |
              +-------------------+
              |  Device Driver    |
              +-------------------+
```
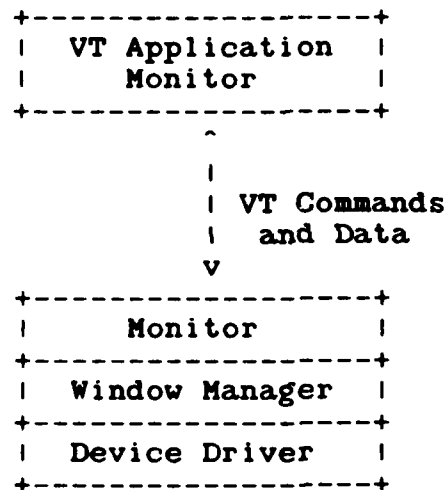
Figure 3-1   Virtual Terminal Structure

3.2 Functional Flow

     The Virtual Terminal can be used in two different modes:
master and slave. Currently, the master mode is used for
interactive devices and the slave mode is used for batch devices
such as printers.

     Figure 3-2 is a data flow for the Virtual Terminal in
master and slave mode.
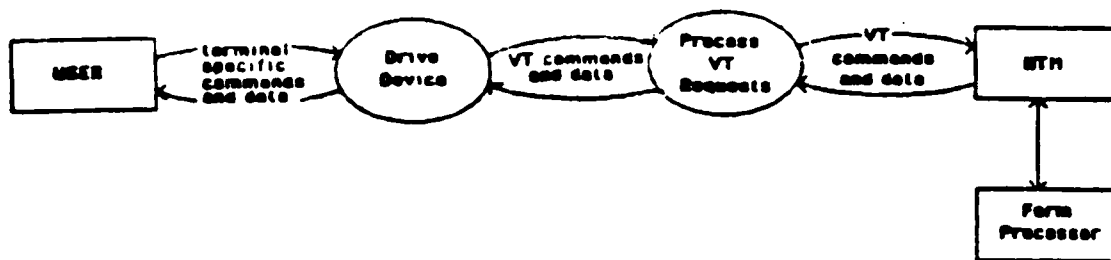
Figure 3-2   Virtual Terminal Data Flow

3.3   Interfaces

3.3.1   Physical Terminal

The interface to a physical terminal is a function of the host Operating System (OS) and is highly system dependent. When somewhat portable functions are recognized, they are isolated into system independent routines thus making as much of the code portable as is possible.

3.3.2   Application

Applications can use the VT Application Monitor to communicate with the VT process. The types of messages that are sent to and from the VT process are dependent upon the mode (master or slave) of the VT process and are described in the next two sections   Device data messages (type DD) contain VT commands and data.   The VT commands are described in Appendix A of the Virtual Terminal Development Specification (DS 620144300B).

3.3.2.1 VT Process as Master

RECEIVE MESSAGES

Message Type	Action Taken/Buffer
SD	Terminates Device Driver.
DD	Send Device Data to be output to Virtual Terminal.
DQ	Send Device Data to be output to Virtual Terminal and request for acknowledgement.

SEND MESSAGES

Message Type	Action Taken/Buffer
DE	Informs UIM that Master Device Driver is entering the UIM system control.
DD	Send Device Data which was input to Virtual Terminal.

Section 3.2.2.1.2 of the Virtual Terminal Development Specification contains a detailed description of these messages.

3.3.2.2 VT Process as Slave

RECEIVE MESSAGES

Message Type	Action Taken/Buffer
DE	Starts up Slave Device Driver.
SD	Terminates Device Driver.
DD	Send Device Data to be output to Virtual Terminal.

SEND MESSAGES

Message Type	Action Taken/Buffer
DI	Informs UIM that slave drive is alive and should be initialized with proper size.
DD	Send Device Data which was input to Virtual Terminal.

Section 3.2.2.2.2 of the Virtual Terminal Development Specification contains a detailed description of these messages.

3.3.3 Terminal User

When the VT process is the master it is started by the terminal user. It has a number of parameters that can be used if scripting is required.

```
-w  ‹scripting file name›      - write script file
-r  ‹scripting file name›      - read script file
-s  ‹save file name›           - saves output from
                                 session
```

These arguments are optional. The user can either create a script file, read a script file, or do neither. The user can also save or not save the output from a session

3.4 Program Interrupts

Attention interrupts received from the terminal (CNTL/C, break) cause the VT process to terminate by calling the NTM routine TRMNAT.

3.5 Timing and Sequencing Description

The Monitor processes two types of input: keyboard characters and NTM messages. First, a check is made for available keyboard characters. As long as characters are available, they are processed. When no characters are available, a check is made for NTM messages. If a message is found, it is processed and the Monitor again checks for keyboard characters. If no message is available, the Monitor waits for approximately .1 seconds before again checking for keyboard characters.

3.6   Special Control Features

The detailed design of the VT does not include any special
control features as defined in the ICAM Documentation Standards
manual.

3.7   Storage Allocation

The executable sizes for the device driver routines for
each supported terminal are:

ADM3A	172 blocks
CI600	165 blocks
IBM3270	not available
PRINTR	153 blocks
PW3270	not available
VIP	174 blocks
VT100	176 blocks
VT100W	176 blocks
VTMIN	175 blocks

3.8   Object Code Creation

The VT routines were compiled using a C compiler developed
by Interactive Software under VAX/VMS.

3.9   Adaptation Data

The C source modules for the VT can be compiled using any
UNIX version 7 compatible C compiler. All routines beginning
with 'TRM' are device dependent, and the routine TERMIO.C is VAX
specific.

3.10   Detailed Design Description

3.10.1   Main Program List

The following is a list of all "Main Programs" which
are modules that are not called by any other module being
documented here. These modules are either program entry points
or, if they are hooked into another set of programs via
subroutine calls, they are the points the external programs can
call and therefore enter through. To differentiate between the
two types of entry points, look at the individual Module
Documentation (section 3.10.8) and look at Module Type for each
of the Main Program modules listed. Note whether the routine

is a Program, Subroutine, or Function. If it is a Program, it
is truly a main program entry point. If not, then it is merely
called by other programs not being documented here.

VIRTUAL TERMINAL Main Program List

Module Name	Purpose
DRIVER/MAIN	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

3.10.2 <u>Module List</u>

The following is a list of all the modules being documented here along with their purpose. Each module has a unique name, no matter what language it was written in.

VIRTUAL TERMINAL Module List

Module Name	Purpose
ABSPOS	ABSOLUTIZE CURSOR POSITION OF FIELD
BLDMSG	BUILD MESSAGE
BLDMSG/BLDBUF	BUILD BUFFER
BLDMSG/REDOFF	READ FLAG TURNED OFF
BVTIDS	BUILD VTI DATA STRUCTURE
BVTIDS/BVTIFM	BUILD VTI FIELD MAP
BVTIDS/CLRFLG	CLEAR FLAGS
BVTIDS/CVTIFM	CLEAR VTI FIELD MAP
BVTIDS/INSFLD	INSERT FIELD
BVTIDS/RVTIFM	REBUILD VTI FIELD MAP
CLRMOD	CLEAR MODIFY FLAGS
DEFFLD	DEFINE FIELD
DEFWND	DEFINE WINDOW
DOSCR/ERASE	ERASE PART OF SCREEN
DOSCR/HSCR	HORIZONTAL SCROLL
DOSCR/VSCR	VERTICAL SCROLL
DOSCREEN	DO COMMAND TO INTERNAL SCREEN
DRIVER/MAIN	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
ERAWND	ERASE WINDOW
FATAL	REPORT FATAL ERROR

VIRTUAL TERMINAL Module List

Module Name	Purpose
FNDWND	FIND WINDOW
GETVT	GET DATA FROM VIRTUAL TERMINAL
GVTICMD	GET VIRTUAL TERMINAL INTERFACE COMMAND
INTVT	INITIALIZE VIRTUAL TERMINAL
INVIS	CHECK FOR INVISIBILITY
PCHVTI	PUT SCREEN CHARACTERS TO VTI DATA STRUCTURE
PRCCMDS	PROCESS COMMAND
PUTVT	PUT DATA TO VIRTUAL TERMINAL
PVTICMD	PUT VTI COMMAND
PVTICMD/PUTNUM	PUT NUMBER
REFRESH	REFRESH TERMINAL
REFTERM	REFRESH TERMINAL
RMVWND	REMOVE WINDOW
SLINEND	FIND SCREEN LINE END
STFMTF	SET FORMAT FLAG FOR ALL CHILDREN WINDOWS AND FIELDS
STRDPN	SET READ PENDING FLAGS
STRDPN/STFDRD	SET FIELD READ PENDING
SWNPRC	SET WINDOW PRECEDENCE
TPUTNUM	TERMINAL PUT NUMBER
TPUTS	TERMINAL PUT STRING

VIRTUAL TERMINAL Module List

Module Name	Purpose
TRMCHK	TERMINAL CHECK
TRMEND	TERMINAL END
TRMFLS	TERMINAL FLUSH
TRMGET	TERMINAL GET
TRMINI	TERMINAL INITIALIZE
TRMPUT	TERMINAL PUT
TRMVT	TERMINATE VIRTUAL TERMINAL
TVTPRC	TERMINATE VTI PROCESS
VT100/MOVCUR	MOVE CURSOR (INTERNAL)
VT100/SETATR	SET ATTRIBUTES (INTERNAL)

3.10.3 <u>External Routines List</u>

The following is a list of all routines or functions not
documented here that are called by modules that are documented
here. The first caller, in alphabetical order, is listed as
well. The specification in which any module is documented may
be found in the Module Documentation Index (Document Number
CM 620100001). See section 3.10 6 for a list of the modules
that call each of these external routines.

VIRTUAL TERMINAL External Routines List

Module Name	First User
BLDCMD	BVTIDS
CABIT	TRMPUT
CALLOC	DEFWND
CBIT	DOSCR/ERASE
COL	TRMPUT
CSTR	INTVT
DELAY	DRIVER/MAIN
EXIT	TVTPRC
FCLOSE	DRIVER/MAIN
FFBDA	TRMPUT
FFBSA	VT100/SETATR
FFBSB	DOSCREEN
FIX	DOSCREEN
FLOOR	DOSCREEN
FOPEN	DRIVER/MAIN
FPRINTF	DRIVER/MAIN
FREE	BVTIDS/INSFLD
FSEARCH	DRIVER/MAIN
FWRITE	DRIVER/MAIN
GETCHAR	TRMPUT
INITEX	DRIVER/MAIN
ISDIGIT	TRMGET
ISPRINT	GVTICMD
LIMIT	DOSCREEN
MALLOC	BVTIDS/INSFLD
MAX	PCHVTI
MEMCMP	DRIVER/MAIN
MEMCPY	DRIVER/MAIN
MEMSET	DEFFLD
MIN	DOSCR/VSCR
NSEND	DRIVER/MAIN
POS	TRMPUT
PRINTF	FATAL
PRNEND	TRMEND
PRNFLS	TRMPUT
PRNINI	TRMINI
PRNPUT	TRMPUT
PUTC	DRIVER/MAIN
RCV	DRIVER/MAIN
ROW	REFRESH
SBIT	DOSCR/VSCR

VIRTUAL TERMINAL External Routines List

Module Name	First User
SIGNAL	DRIVER/MAIN
SPRINTF	DRIVER/MAIN
STRASN	BVTIDS/CVTIFM
STRCAT	DRIVER/MAIN
STRCPY	DRIVER/MAIN
STRLEN	BLDMSG/BLDBUF
TBIT	DOSCR/ERASE
TBOPEN	TRMINI
TCHECK	TRMCHK
TCLOSE	TRMEND
TFLUSH	TRMFLS
TGETC	TRMGET
TOLOWER	DRIVER/MAIN
TPURGE	TRMGET
TPUTC	VT100/SETATR
TRMNAT	DRIVER/MAIN
ZERO	DOSCREEN

3.10.4 <u>Include File List</u>

The following is a list of all include files called in by modules being documented here. Each include file has a unique name regardless of the language being used. The purpose of each include file is listed as well. A more complete description of each include file is given in section 3.10.9. The purpose listed is the one that is in the source code of the include file.

A purpose of "**** PURPOSE NOT FOUND BY STRIPPER ****" indicates that a purpose statement was not written into the include file itself. The most common reason for this is that the include file comes from system libraries that were not developed by the project, such as 'C' libraries that are provided with the 'C' compiler.

See section 3.10.6 for a set of lists which show all the modules which call in each of these include files.

VIRTUAL TERMINAL Include File List

File Name	Purpose
BITS	INCLUDE FILE FOR BIT MANIPULATION ROUTINES
CI600.C"	**** PURPOSE NOT FOUND BY STRIPPER ****
CTLCHR	CONTROL CHARACTERS
CTYPE	**** PURPOSE NOT FOUND BY STRIPPER ****
DEVICE	PHYSICAL DEVICE DATA STRUCTURE
DEVINI	DEVICE INITIALIZATIONS
FUNCTS	FUNCTION DEFINITIONS
NTM	NTM INTERFACE INCLUDE FILE
SCREEN	INTERNAL SCREEN DEFINITIONS
SIGNAL	**** PURPOSE NOT FOUND BY STRIPPER ****
STDIO	**** PURPOSE NOT FOUND BY STRIPPER ****
STDTYP	STANDARD TYPE DEFINITIONS
TERMIO	TRANSPARENT TERMINAL I/O DEFINITIONS
TRMRTN	TERMINAL (DEVICE DRIVER) ROUTINES

3.10.5 Where Include File Used List

The following lists each include file from 3.10.4 and
all the modules documented in this specification which include
them. The purpose of each module is listed as well.

VIRTUAL TERMINAL Where-include-file-used List

Include File	Module Name	Module Purpose
BITS		
	BLDMSG	BUILD MESSAGE
	BLDMSG/BL	BUILD BUFFER
	BLDMSG/RE	READ FLAG TURNED OFF
	BVTIDS	BUILD VTI DATA STRUCTURE
	BVTIDS/BV	BUILD VTI FIELD MAP
	BVTIDS/CL	CLEAR FLAGS
	BVTIDS/CV	CLEAR VTI FIELD MAP
	BVTIDS/IN	INSERT FIELD
	BVTIDS/RV	REBUILD VTI FIELD MAP
	CLRMOD	CLEAR MODIFY FLAGS
	DEFFLD	DEFINE FIELD
	DEFWND	DEFINE WINDOW
	DOSCR/ERA	ERASE PART OF SCREEN
	DOSCR/HSC	HORIZONTAL SCROLL
	DOSCR/VSC	VERTICAL SCROLL
	DOSCREEN	DO COMMAND TO INTERNAL SCREEN
	DRIVER/MA	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
	ERAWND	ERASE WINDOW
	GETVT	GET DATA FROM VIRTUAL TERMINAL
	GVTICMD	GET VIRTUAL TERMINAL INTERFACE COMMAND
	INTVT	INITIALIZE VIRTUAL TERMINAL
	INVIS	CHECK FOR INVISIBILITY
	PCHVTI	PUT SCREEN CHARACTERS TO VTI DATA STRUCTURE
	PRCCMDS	PROCESS COMMAND
	PUTVT	PUT DATA TO VIRTUAL TERMINAL
	PVTICMD	PUT VTI COMMAND
	PVTICMD/P	PUT NUMBER
	REFRESH	REFRESH TERMINAL
	REFTERM	REFRESH TERMINAL
	RMVWND	REMOVE WINDOW
	SLINEND	FIND SCREEN LINE END
	STFMTF	SET FORMAT FLAG FOR ALL CHILDREN WINDOWS AND FIELDS
	SWNPRC	SET WINDOW PRECEDENCE
	TRMCHK	TERMINAL CHECK
	TRMEND	TERMINAL END
	TRMFLS	TERMINAL FLUSH

VIRTUAL TERMINAL Where-include-file-used List

Include File	Module Name	Module Purpose
	TRMGET	TERMINAL GET
	TRMINI	TERMINAL INITIALIZE
	TRMPUT	TERMINAL PUT
	TRMVT	TERMINATE VIRTUAL TERMINAL
	VT100/MOV	MOVE CURSOR (INTERNAL)
	VT100/SET	SET ATTRIBUTES (INTERNAL)

CI600.C"
	TRMCHK	TERMINAL CHECK
	TRMEND	TERMINAL END
	TRMFLS	TERMINAL FLUSH
	TRMGET	TERMINAL GET
	TRMINI	TERMINAL INITIALIZE
	TRMPUT	TERMINAL PUT
	VT100/MOV	MOVE CURSOR (INTERNAL)
	VT100/SET	SET ATTRIBUTES (INTERNAL)

CTLCHR
	BLDMSG	BUILD MESSAGE
	BLDMSG/BL	BUILD BUFFER
	BLDMSG/RE	READ FLAG TURNED OFF
	DRIVER/MA	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
	GVTICMD	GET VIRTUAL TERMINAL INTERFACE COMMAND
	INTVT	INITIALIZE VIRTUAL TERMINAL
	PVTICMD	PUT VTI COMMAND
	PVTICMD/P	PUT NUMBER
	TRMVT	TERMINATE VIRTUAL TERMINAL

CTYPE
| | DEFFLD | DEFINE FIELD |

VIRTUAL TERMINAL Where-include-file-used List

Include File	Module Name	Module Purpose
	GVTICMD	GET VIRTUAL TERMINAL INTERFACE COMMAND
	TRMCHK	TERMINAL CHECK
	TRMEND	TERMINAL END
	TRMFLS	TERMINAL FLUSH
	TRMGET	TERMINAL GET
	TRMINI	TERMINAL INITIALIZE
	TRMPUT	TERMINAL PUT
	VT100/MOV	MOVE CURSOR (INTERNAL)
	VT100 SET	SET ATTRIBUTES (INTERNAL)

DEVICE

	ABSPOS	ABSOLUTIZE CURSOR POSITION OF FIELD
	BLDMSG	BUILD MESSAGE
	BLDMSG/BL	BUILD BUFFER
	BLDMSG/RE	READ FLAG TURNED OFF
	BVTIDS	BUILD VTI DATA STRUCTURE
	BVTIDS/BV	BUILD VTI FIELD MAP
	BVTIDS/CL	CLEAR FLAGS
	BVTIDS/CV	CLEAR VTI FIELD MAP
	BVTIDS/IN	INSERT FIELD
	BVTIDS/RV	REBUILD VTI FIELD MAP
	DEFFLD	DEFINE FIELD
	DEFWND	DEFINE WINDOW
	DRIVER/MA	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
	ERAWND	ERASE WINDOW
	FNDWND	FIND WINDOW
	GETVT	GET DATA FROM VIRTUAL TERMINAL
	PCHVTI	PUT SCREEN CHARACTERS TO VTI DATA STRUCTURE
	PUTVT	PUT DATA TO VIRTUAL TERMINAL
	RMVWND	REMOVE WINDOW
	STFMTF	SET FORMAT FLAG FOR ALL CHILDREN WINDOWS AND FIELDS
	STRDPN	SET READ PENDING FLAGS
	STRDPN/ST	SET FIELD READ PENDING
	SWNPRC	SET WINDOW PRECEDENCE

VIRTUAL TERMINAL Where-include-file-used List

Include File	Module Name	Module Purpose
-------	------	-------

DEVINI

DRIVER MA MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

FUNCTS

BLDMSG   BUILD MESSAGE
BLDMSG/BL BUILD BUFFER
BLDMSG/RE READ FLAG TURNED OFF
BVTIDS   BUILD VTI DATA STRUCTURE
BVTIDS/BV BUILD VTI FIELD MAP
BVTIDS/CL CLEAR FLAGS
BVTIDS/CV CLEAR VTI FIELD MAP
BVTIDS/IN INSERT FIELD
BVTIDS/RV REBUILD VTI FIELD MAP
DEFFLD   DEFINE FIELD
DEFWND   DEFINE WINDOW
DOSCR/ERA ERASE PART OF SCREEN
DOSCR/HSC HORIZONTAL SCROLL
DOSCR/VSC VERTICAL SCROLL
DOSCREEN DO COMMAND TO INTERNAL SCREEN
DRIVER/MA MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
GETVT   GET DATA FROM VIRTUAL TERMINAL
GVTICMD   GET VIRTUAL TERMINAL INTERFACE COMMAND
INTVT   INITIALIZE VIRTUAL TERMINAL
PCHVTI   PUT SCREEN CHARACTERS TO VTI DATA STRUCTURE
PRCCMDS   PROCESS COMMAND
PUTVT   PUT DATA TO VIRTUAL TERMINAL
PVTICMD   PUT VTI COMMAND
PVTICMD/P PUT NUMBER
REFRESH   REFRESH TERMINAL
REFTERM   REFRESH TERMINAL

VIRTUAL TERMINAL Where-include-file-used List

Include File	Module Name	Module Purpose
	STFMTF	SET FORMAT FLAG FOR ALL CHILDREN WINDOWS AND FIELDS
	SWNPRC	SET WINDOW PRECEDENCE
	TRMCHK	TERMINAL CHECK
	TRMEND	TERMINAL END
	TRMFLS	TERMINAL FLUSH
	TRMGET	TERMINAL GET
	TRMINI	TERMINAL INITIALIZE
	TRMPUT	TERMINAL PUT
	TRMVT	TERMINATE VIRTUAL TERMINAL
	VT100/MOV	MOVE CURSOR (INTERNAL)
	VT100/SET	SET ATTRIBUTES (INTERNAL)

NTM

DRIVER/MA MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

SCREEN

	BLDMSG	BUILD MESSAGE
	BLDMSG BL	BUILD BUFFER
	BLDMSG/RE	READ FLAG TURNED OFF
	BVTIDS	BUILD VTI DATA STRUCTURE
	BVTIDS/BV	BUILD VTI FIELD MAP
	BVTIDS/CL	CLEAR FLAGS
	BVTIDS/CV	CLEAR VTI FIELD MAP
	BVTIDS/IN	INSERT FIELD
	BVTIDS/RV	REBUILD VTI FIELD MAP
	CLRMOD	CLEAR MODIFY FLAGS
	DOSCR/ERA	ERASE PART OF SCREEN
	DOSCR/HSC	HORIZONTAL SCROLL
	DOSCR/VSC	VERTICAL SCROLL
	DOSCREEN	DO COMMAND TO INTERNAL SCREEN
	DRIVER/MA	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Where-include-file-used List

Include File	Module Name	Module Purpose
	GETVT	GET DATA FROM VIRTUAL TERMINAL
	INTVT	INITIALIZE VIRTUAL TERMINAL
	INVIS	CHECK FOR INVISIBILITY
	PCHVTI	PUT SCREEN CHARACTERS TO VTI DATA STRUCTURE
	PRCCMDS	PROCESS COMMAND
	PUTVT	PUT DATA TO VIRTUAL TERMINAL
	PVTICMD	PUT VTI COMMAND
	PVTICMD/P	PUT NUMBER
	REFRESH	REFRESH TERMINAL
	REFTERM	REFRESH TERMINAL
	SLINEND	FIND SCREEN LINE END
	TRMCHK	TERMINAL CHECK
	TRMEND	TERMINAL END
	TRMFLS	TERMINAL FLUSH
	TRMGET	TERMINAL GET
	TRMINI	TERMINAL INITIALIZE
	TRMPUT	TERMINAL PUT
	TRMVT	TERMINATE VIRTUAL TERMINAL
	VT100/MOV	MOVE CURSOR (INTERNAL)
	VT100/SET	SET ATTRIBUTES (INTERNAL)
SIGNAL		
	DRIVER/MA	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
STDIO		
	DRIVER/MA	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
	FATAL	REPORT FATAL ERROR
	TRMCHK	TERMINAL CHECK
	TRMEND	TERMINAL END
	TRMFLS	TERMINAL FLUSH
	TRMGET	TERMINAL GET

VIRTUAL TERMINAL Where-include-file-used List

Include File	Module Name	Module Purpose
	TRMINI	TERMINAL INITIALIZE
	TRMPUT	TERMINAL PUT
	VT100/MOV	MOVE CURSOR (INTERNAL)
	VT100/SET	SET ATTRIBUTES (INTERNAL)
STDTYP		
	ABSPOS	ABSOLUTIZE CURSOR POSITION OF FIELD
	BLDMSG	BUILD MESSAGE
	BLDMSG/BL	BUILD BUFFER
	BLDMSG/RE	READ FLAG TURNED OFF
	BVTIDS	BUILD VTI DATA STRUCTURE
	BVTIDS/BV	BUILD VTI FIELD MAP
	BVTIDS/CL	CLEAR FLAGS
	BVTIDS/CV	CLEAR VTI FIELD MAP
	BVTIDS/IN	INSERT FIELD
	BVTIDS/RV	REBUILD VTI FIELD MAP
	CLRMOD	CLEAR MODIFY FLAGS
	DEFFLD	DEFINE FIELD
	DEFWND	DEFINE WINDOW
	DOSCR/ERA	ERASE PART OF SCREEN
	DOSCR/HSC	HORIZONTAL SCROLL
	DOSCR/VSC	VERTICAL SCROLL
	DOSCREEN	DO COMMAND TO INTERNAL SCREEN
	DRIVER/MA	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
	ERAWND	ERASE WINDOW
	FATAL	REPORT FATAL ERROR
	FNDWND	FIND WINDOW
	GETVT	GET DATA FROM VIRTUAL TERMINAL
	GVTICMD	GET VIRTUAL TERMINAL INTERFACE COMMAND
	INTVT	INITIALIZE VIRTUAL TERMINAL
	INVIS	CHECK FOR INVISIBILITY
	PCHVTI	PUT SCREEN CHARACTERS TO VTI DATA STRUCTURE
	PRCCMDS	PROCESS COMMAND
	PUTVT	PUT DATA TO VIRTUAL TERMINAL
	PVTICMD	PUT VTI COMMAND

VIRTUAL TERMINAL Where-include-file-used List

Include File	Module Name	Module Purpose
	PVTICMD/P	PUT NUMBER
	REFRESH	REFRESH TERMINAL
	REFTERM	REFRESH TERMINAL
	RMVWND	REMOVE WINDOW
	SLINEND	FIND SCREEN LINE END
	STFMTF	SET FORMAT FLAG FOR ALL CHILDREN WINDOWS AND FIELDS
	STRDPN	SET READ PENDING FLAGS
	STRDPN/ST	SET FIELD READ PENDING
	SWNPRC	SET WINDOW PRECEDENCE
	TPUTNUM	TERMINAL PUT NUMBER
	TPUTS	TERMINAL PUT STRING
	TRMCHK	TERMINAL CHECK
	TRMEND	TERMINAL END
	TRMFLS	TERMINAL FLUSH
	TRMGET	TERMINAL GET
	TRMINI	TERMINAL INITIALIZE
	TRMPUT	TERMINAL PUT
	TRMVT	TERMINATE VIRTUAL TERMINAL
	TVTPRC	TERMINATE VTI PROCESS
	VT100/MOV	MOVE CURSOR (INTERNAL)
	VT100/SET	SET ATTRIBUTES (INTERNAL)

TERMIO

	DRIVER/MA	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
	PRCCMDS	PROCESS COMMAND
	PUTVT	PUT DATA TO VIRTUAL TERMINAL
	TPUTNUM	TERMINAL PUT NUMBER
	TPUTS	TERMINAL PUT STRING
	TRMCHK	TERMINAL CHECK
	TRMEND	TERMINAL END
	TRMFLS	TERMINAL FLUSH
	TRMGET	TERMINAL GET
	TRMINI	TERMINAL INITIALIZE
	TRMPUT	TERMINAL PUT
	VT100/MOV	MOVE CURSOR (INTERNAL)

VIRTUAL TERMINAL Where-include-file-used List

Include File	Module Name	Module Purpose
	VT100/SET	SET ATTRIBUTES (INTERNAL)
TRMRTN		
	DRIVER/MA	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
	GETVT	GET DATA FROM VIRTUAL TERMINAL
	INTVT	INITIALIZE VIRTUAL TERMINAL
	PRCCMDS	PROCESS COMMAND
	PUTVT	PUT DATA TO VIRTUAL TERMINAL
	REFRESH	REFRESH TERMINAL
	REFTERM	REFRESH TERMINAL
	TRMCHK	TERMINAL CHECK
	TRMEND	TERMINAL END
	TRMFLS	TERMINAL FLUSH
	TRMGET	TERMINAL GET
	TRMINI	TERMINAL INITIALIZE
	TRMPUT	TERMINAL PUT
	TRMVT	TERMINATE VIRTUAL TERMINAL
	VT100/MOV	MOVE CURSOR (INTERNAL)
	VT100/SET	SET ATTRIBUTES (INTERNAL)

3.10.6 Where External Routine Used List

The following lists each external function or routine listed in 3.10.3 and all the documented modules which call it. The purpose of each module is listed as well.

VIRTUAL TERMINAL Where-external-routine-used List

System Module	Module Name	Module Purpose

BLDCMD

	BVTIDS	BUILD VTI DATA STRUCTURE
	DRIVER/MAI	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
	GETVT	GET DATA FROM VIRTUAL TERMINAL
	PRCCMDS	PROCESS COMMAND
	PUTVT	PUT DATA TO VIRTUAL TERMINAL
	REFRESH	REFRESH TERMINAL
	REFTERM	REFRESH TERMINAL
	TRMGET	TERMINAL GET

CABIT

| | DOSCREEN | DO COMMAND TO INTERNAL SCREEN |
| | TRMPUT | TERMINAL PUT |

CALLOC

	DEFFLD	DEFINE FIELD
	DEFWND	DEFINE WINDOW
	DRIVER/MAI	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

CBIT

	CLRMOD	CLEAR MODIFY FLAGS
	DOSCR/ERAS	ERASE PART OF SCREEN
	DOSCR/VSCR	VERTICAL SCROLL
	DOSCREEN	DO COMMAND TO INTERNAL SCREEN
	REFRESH	REFRESH TERMINAL
	REFTERM	REFRESH TERMINAL

COL

| | BLDMSG | BUILD MESSAGE |
| | BVTIDS | BUILD VTI DATA STRUCTURE |

VIRTUAL TERMINAL Where-external-routine-used List

System Module	Module Name	Module Purpose
	DOSCR/ERAS	ERASE PART OF SCREEN
	DOSCR/HSCR	HORIZONTAL SCROLL
	DOSCR/VSCR	VERTICAL SCROLL
	DOSCREEN	DO COMMAND TO INTERNAL SCREEN
	PRCCMDS	PROCESS COMMAND
	REFRESH	REFRESH TERMINAL
	REFTERM	REFRESH TERMINAL
	SLINEND	FIND SCREEN LINE END
	TRMGET	TERMINAL GET
	TRMPUT	TERMINAL PUT
	VT100/MOVC	MOVE CURSOR (INTERNAL)
CSTR		
	INTVT	INITIALIZE VIRTUAL TERMINAL
DELAY		
	DRIVER/MAI	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
EXIT		
	DRIVER/MAI	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
	TVTPRC	TERMINATE VTI PROCESS
FCLOSE		
	DRIVER/MAI	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
FFBDA		
	TRMPUT	TERMINAL PUT

VIRTUAL TERMINAL Where-external-routine-used List

System Module	Module Name	Module Purpose

FFBSA

    DOSCREEN   DO COMMAND TO INTERNAL SCREEN
    TRMPUT   TERMINAL PUT
    VT100/SETASET ATTRIBUTES (INTERNAL)

FFBSB

    DOSCREEN   DO COMMAND TO INTERNAL SCREEN

FIX

    DOSCREEN   DO COMMAND TO INTERNAL SCREEN

FLOOR

    DOSCREEN   DO COMMAND TO INTERNAL SCREEN

FOPEN

    DRIVER/MAIMAIN MODULE FOR WINDOW MANAGER AND DEVICE
              DRIVER

FPRINTF

    DRIVER/MAIMAIN MODULE FOR WINDOW MANAGER AND DEVICE
              DRIVER

FREE

    BVTIDS/CVTCLEAR VTI FIELD MAP
    BVTIDS/INSINSERT FIELD

VIRTUAL TERMINAL Where-external-routine-used List

System Module	Module Name	Module Purpose
	DRIVER/MAIMAIN	MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
	ERAWND	ERASE WINDOW
	INTVT	INITIALIZE VIRTUAL TERMINAL
	RMVWND	REMOVE WINDOW
	TRMVT	TERMINATE VIRTUAL TERMINAL

FSEARCH

DRIVER/MAIMAIN MODULE FOR WINDOW MANAGER AND DEVICE
DRIVER

FWRITE

DRIVER/MAIMAIN MODULE FOR WINDOW MANAGER AND DEVICE
DRIVER

GETCHAR

| TRMGET | TERMINAL GET |
| TRMPUT | TERMINAL PUT |

INITEX

DRIVER/MAIMAIN MODULE FOR WINDOW MANAGER AND DEVICE
DRIVER

ISDIGIT

| GVTICMD | GET VIRTUAL TERMINAL INTERFACE COMMAND |
| TRMGET | TERMINAL GET |

ISPRINT

VIRTUAL TERMINAL Where-external-routine-used List

System Module	Module Name	Module Purpose
------	------	-------
	DEFFLD	DEFINE FIELD
	GVTICMD	GET VIRTUAL TERMINAL INTERFACE COMMAND
	TRMGET	TERMINAL GET
LIMIT		
	DOSCREEN	DO COMMAND TO INTERNAL SCREEN
MALLOC		
	BVTIDS/BVTBUILD	VTI FIELD MAP
	BVTIDS/CVTCLEAR	VTI FIELD MAP
	BVTIDS/INSINSERT	FIELD
	DEFFLD	DEFINE FIELD
	DRIVER/MAIMAIN	MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
	INTVT	INITIALIZE VIRTUAL TERMINAL
MAX		
	BVTIDS	BUILD VTI DATA STRUCTURE
	BVTIDS/INSINSERT	FIELD
	DEFWND	DEFINE WINDOW
	DOSCR/VSCRVERTICAL	SCROLL
	DOSCREEN	DO COMMAND TO INTERNAL SCREEN
	PCHVTI	PUT SCREEN CHARACTERS TO VTI DATA STRUCTURE
	REFTERM	REFRESH TERMINAL
MEMCMP		
	BVTIDS	BUILD VTI DATA STRUCTURE
	DRIVER/MAIMAIN	MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

3-32

VIRTUAL TERMINAL Where-external-routine-used List

System Module	Module Name	Module Purpose

MEMCPY

BLDMSG   BUILD MESSAGE
BLDMSG/BLDBUILD BUFFER
DRIVER/MAIMAIN MODULE FOR WINDOW MANAGER AND DEVICE
       DRIVER

MEMSET

DEFFLD   DEFINE FIELD

MIN

BVTIDS/INSINSERT FIELD
DEFWND   DEFINE WINDOW
DOSCR/HSCRHORIZONTAL SCROLL
DOSCR/VSCRVERTICAL SCROLL
DRIVER/MAIMAIN MODULE FOR WINDOW MANAGER AND DEVICE
       DRIVER
REFTERM   REFRESH TERMINAL

NSEND

DRIVER/MAIMAIN MODULE FOR WINDOW MANAGER AND DEVICE
       DRIVER

POS

DOSCREEN DO COMMAND TO INTERNAL SCREEN
TRMPUT   TERMINAL PUT

PRINTF

VIRTUAL TERMINAL Where-external-routine-used List

System Module	Module Name	Module Purpose
	DRIVER MAI	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
	FATAL	REPORT FATAL ERROR
	TRMGET	TERMINAL GET
	TRMPUT	TERMINAL PUT
PRNEND		
	TRMEND	TERMINAL END
PRNFLS		
	TRMPUT	TERMINAL PUT
PRNINI		
	TRMINI	TERMINAL INITIALIZE
PRNPUT		
	TRMPUT	TERMINAL PUT
PUTC		
	DRIVER/MAI	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
RCV		
	DRIVER/MAI	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Where-external-routine-used List

System Module	Module Name	Module Purpose

ROW

	BLDMSG	BUILD MESSAGE
	BVTIDS	BUILD VTI DATA STRUCTURE
	DOSCR VSCRVERTICAL SCROLL	
	DOSCREEN	DO COMMAND TO INTERNAL SCREEN
	PRCCMDS	PROCESS COMMAND
	REFRESH	REFRESH TERMINAL
	REFTERM	REFRESH TERMINAL
	TRMGET	TERMINAL GET
	TRMPUT	TERMINAL PUT
	VT100 MOVCMOVE CURSOR (INTERNAL)	

SBIT

	DOSCR/ERASERASE PART OF SCREEN	
	DOSCR/VSCRVERTICAL SCROLL	
	DOSCREEN	DO COMMAND TO INTERNAL SCREEN
	REFRESH	REFRESH TERMINAL
	REFTERM	REFRESH TERMINAL
	TRMPUT	TERMINAL PUT

SIGNAL

DRIVER/MAIMAIN MODULE FOR WINDOW MANAGER AND DEVICE
        DRIVER

SPRINTF

	BLDMSG	BUILD MESSAGE
	BLDMSG/BLDBUILD BUFFER	

DRIVER/MAIMAIN MODULE FOR WINDOW MANAGER AND DEVICE
        DRIVER

STRASN

	BVTIDS	BUILD VTI DATA STRUCTURE

VIRTUAL TERMINAL Where-external-routine-used List

System Module	Module Name	Module Purpose
	BVTIDS/CVTCLEAR	VTI FIELD MAP
	BVTIDS'INSINSERT	FIELD
	DOSCR/ERASERASE	PART OF SCREEN
STRCAT		
	DRIVER/MAIMAIN	MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
STRCPY		
	DRIVER/MAIMAIN	MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
STRLEN		
	BLDMSG	BUILD MESSAGE
	BLDMSG/BLDBUILD	BUFFER
	DRIVER/MAIMAIN	MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
TBIT		
	DOSCR'ERASERASE	PART OF SCREEN
	DOSCR/HSCRHORIZONTAL	SCROLL
	DOSCR'VSCRVERTICAL	SCROLL
	DOSCREEN	DO COMMAND TO INTERNAL SCREEN
	GETVT	GET DATA FROM VIRTUAL TERMINAL
	INVIS	CHECK FOR INVISIBILITY
	PCHVTI	PUT SCREEN CHARACTERS TO VTI DATA STRUCTURE
	PRCCMDS	PROCESS COMMAND
	PUTVT	PUT DATA TO VIRTUAL TERMINAL
	REFRESH	REFRESH TERMINAL
	REFTERM	REFRESH TERMINAL
	TRMGET	TERMINAL GET

VIRTUAL TERMINAL Where-external-routine-used List

System Module	Module Name	Module Purpose
	TRMPUT	TERMINAL PUT
TBOPEN	TRMINI	TERMINAL INITIALIZE
TCHECK	TRMCHK	TERMINAL CHECK
TCLOSE	TRMEND	TERMINAL END
TFLUSH	TRMFLS	TERMINAL FLUSH
TGETC	TRMGET	TERMINAL GET
TOLOWER	DRIVER	MAIMAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
TPURGE	TRMGET	TERMINAL GET

VIRTUAL TERMINAL Where-external-routine-used List

System Module	Module Name	Module Purpose

TPUTC

	TPUTNUM	TERMINAL PUT NUMBER
	TPUTS	TERMINAL PUT STRING
	TRMPUT	TERMINAL PUT
	VT100/MOVCMOVE	CURSOR (INTERNAL)
	VT100/SETASET	ATTRIBUTES (INTERNAL)

TRMNAT

| | DRIVER/MAIMAIN | MODULE FOR WINDOW MANAGER AND DEVICE DRIVER |
| | TVTPRC | TERMINATE VTI PROCESS |

ZERO

| | DOSCREEN | DO COMMAND TO INTERNAL SCREEN |

3.10.7 Main Program Parts List

The following lists each Main Program listed in 3.10.1
and all the modules which are called either by that module
itself or by any of the documented modules which it calls. It
is possible for a non-main module to be listed more that once
if it is called by multiple modules. The called modules, in
this case known as program parts, are marked as to whether
they are documented here. If so, the phrase "well-defined
module" appears by the module name, if not it is an "external
"routine". The Purpose of the Main Program module is listed
as well.

VIRTUAL TERMINAL Main Program Parts List

Main Pgm Name	Module Name	Module Type
DRIVER/MAIN	Purpose-->	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
	ABSPOS	Well-defined module
	BLDCMD	External routine
	BLDMSG	Well-defined module
	BLDMSG/BLDBUF	Well-defined module
	BLDMSG/REDOFF	Well-defined module
	BVTIDS	Well-defined module
	BVTIDS/BVTIFM	Well-defined module
	BVTIDS/CLRFLG	Well-defined module
	BVTIDS/CVTIFM	Well-defined module
	BVTIDS/INSFLD	Well-defined module
	BVTIDS/RVTIFM	Well-defined module
	CABIT	External routine
	CALLOC	External routine
	CBIT	External routine
	CLRMOD	Well-defined module
	COL	External routine
	CSTR	External routine
	DEFFLD	Well-defined module
	DEFWND	Well-defined module
	DELAY	External routine
	DOSCR/ERASE	Well-defined module
	DOSCR/HSCR	Well-defined module
	DOSCR/VSCR	Well-defined module
	DOSCREEN	Well-defined module
	ERAWND	Well-defined module
	EXIT	External routine
	FATAL	Well-defined module
	FCLOSE	External routine
	FFBDA	External routine
	FFBSA	External routine
	FFBSB	External routine
	FIX	External routine
	FLOOR	External routine
	FNDWND	Well-defined module
	FOPEN	External routine
	FPRINTF	External routine
	FREE	External routine
	FSEARCH	External routine

VIRTUAL TERMINAL Main Program Parts List

Main Pgm Name	Module Name	Module Type
	FWRITE	External routine
	GETCHAR	External routine
	GETVT	Well-defined module
	GVTICMD	Well-defined module
	INITEX	External routine
	INTVT	Well-defined module
	INVIS	Well-defined module
	ISDIGIT	External routine
	ISPRINT	External routine
	LIMIT	External routine
	MALLOC	External routine
	MAX	External routine
	MEMCMP	External routine
	MEMCPY	External routine
	MEMSET	External routine
	MIN	External routine
	NSEND	External routine
	PCHVTI	Well-defined module
	POS	External routine
	PRCCMDS	Well-defined module
	PRINTF	External routine
	PRNEND	External routine
	PRNFLS	External routine
	PRNINI	External routine
	PRNPUT	External routine
	PUTC	External routine
	PUTVT	Well-defined module
	PVTICMD	Well-defined module
	PVTICMD/PUTNUM	Well-defined module
	RCV	External routine
	REFRESH	Well-defined module
	REFTERM	Well-defined module
	RMVWND	Well-defined module
	ROW	External routine
	SBIT	External routine
	SIGNAL	External routine
	SLINEND	Well-defined module
	SPRINTF	External routine
	STFMTF	Well-defined module
	STRASN	External routine

VIRTUAL TERMINAL Main Program Parts List

Main Pgm Name	Module Name	Module Type
--------	------	------
	STRCAT	External routine
	STRCPY	External routine
	STRDPN	Well-defined module
	STRDPN/STFDRD	Well-defined module
	STRLEN	External routine
	SWNPRC	Well-defined module
	TBIT	External routine
	TBOPEN	External routine
	TCHECK	External routine
	TCLOSE	External routine
	TFLUSH	External routine
	TGETC	External routine
	TOLOWER	External routine
	TPURGE	External routine
	TPUTC	External routine
	TPUTNUM	Well-defined module
	TPUTS	Well-defined module
	TRMCHK	Well-defined module
	TRMEND	Well-defined module
	TRMFLS	Well-defined module
	TRMGET	Well-defined module
	TRMINI	Well-defined module
	TRMNAT	External routine
	TRMPUT	Well-defined module
	TRMVT	Well-defined module
	TVTPRC	Well-defined module
	VT100/MOVCUR	Well-defined module
	VT100/SETATR	Well-defined module
	ZERO	External routine

3.10.8 Module Documentation

The following documentation describes information
which is specific to each individual module being documented
in this specification as listed in section 3.10.2. It
provides a compact way of getting information that would be
otherwise buried within each module's source code.

The specific items in this module documentation have the
following meanings:

NAME: Name of program Module.

PURPOSE: Purpose of Module as detailed in the
                            source code.

LANGUAGE: Programming language source code is
                            written in.
                            The choices are:
                                            VAX-11 FORTRAN

        C   (I/S-1 Workbench 'C')
                                            VAX-11 COBOL

MODULE TYPE: Whether a Program, Subroutine, or
                            Function.

SOURCE FILE: Name of Source File from file
                            specification.

SOURCE FILE TYPE: Source File Extension from file
                            specification.

HOST: Whether this is a host-dependent
                            routine (VAX or IBM) or blank if
                            host-independent.

SUBSYSTEM: IISS sub-system this file resides in.

SUBDIRECTORY: Sub-directory of that subsystem in
                            which this file resides.

DOCUMENTATION GROUP: Name of documentation group of which
                            this source file is a member.

DESCRIPTION: A description of the module as otained

from the source code.

ARGUMENTS: The arguments with which this routine
                            is called if it is a Subroutine or a
                            Function.

INCLUDE FILES: A list of all the files that are
                            included into this module as well as
                            their purposes.

ROUTINES CALLED: Subroutines or Functions, either
                            documented or external, called by
                            this module, if any.

CALLED DIRECTLY BY: The documented routines which call
                            this module, if any.

USED IN MAIN PROGRAM(S):   The documented Main Programs which
                            contain this module in their parts
                            list according to the list in section
                            3.10.7.

The Module Documentation is arranged alphabetically according
to Module Name.

VIRTUAL TERMINAL Module Documentation

```
NAME:                 ABSPOS
PURPOSE:              ABSOLUTIZE CURSOR POSITION OF FIELD
LANGUAGE:             C
MODULE TYPE:          SUBROUTINE
FUNCTION TYPE:        VOID ()
SOURCE FILE:          ABSPOS
SOURCE FILE TYPE:     .C
HOST:
SUBSYSTEM:            UI
SUBDIRECTORY:         DRIVER
DOCUMENTATION GROUP:  VIRTERM
```

DESCRIPTION:

SYNOPSIS
```
    VOID ABSPOS(WNDPTR,ACRPOS)
       WND      *WNDPTR;
       POSITION *ACRPOS;
```


INPUTS/OUTPUTS:

INPUTS:
  WNDPTR - WINDOW WHOSE ROW AND COL WANT TO ABSOLUTIZED
  ADDRESS OF STURCTURE FOR RETURNING VALUES OF:

                                              ABSOLUTE
                ROW
                                              ABSOLUTE
                COL
OUTPUTS:
  STRUCTURE CONTAINING:
                        ABSOLUTE ROW OF FIELD
                        ABSOLUTE COL OF FIELD

DESCRIPTION
    THIS MODULE ABSOLUTIZES A FIELD'S ROW AND COL BY GOING
                    BACK UP
    CHILD PARENT TREE AND ADDING EACH SUCCESSIVE PARENT'S ROW
                    AND COL
    TO SUM OF CHILDS'.

ARGUMENTS:

  WNDPTR =   WND *
  ACRPOS =   POSITION *

INCLUDE FILES:

  STDTYP   - STANDARD TYPE DEFINITIONS
  DEVICE   - PHYSICAL DEVICE DATA STRUCTURE

CALLED DIRECTLY BY:

  BVTIDS   - BUILD VTI DATA STRUCTURE
  PCHVTI   - PUT SCREEN CHARACTERS TO VTI DATA STRUCTURE

USED IN MAIN PROGRAM(S):

  DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: BLDMSG
PURPOSE: BUILD MESSAGE
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: BLDMSG
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

  SYNOPSIS
     VOID BLDMSG(BUFF, MAXLEN, LEN)
        CHAR BUFF[];
        INT MAXLEN;
        INT *LEN;

     INPUTS/OUTPUTS:

     INPUTS:
        ADDRESS OF BUFF WHERE FORMATED MESSAGE TO BE PUT
        MAXLEN - LENGTH OF THIS MEMORY AREA
        ADDRESS OF LOCATION WHERE LEN OF THIS FORMATTED MESSAGE
                       TO BE PUT

     OUTPUTS:
        BUFF - CONTAINES FORMATED MESSAGE
        LEN - CONTAINES LENGTH OF THIS FORMATED MESSAGE
  DESCRIPTION
        THIS MODULE BUILDS A FORMATED MESSAGE(TO BE SENT ACROSS
                       NTM TO MONITOR)

ARGUMENTS:

  BUFF =   CHAR []
  MAXLEN =   INT
  LEN =   INT *

INCLUDE FILES:

    STDTYP   - STANDARD TYPE DEFINITIONS
    BITS   - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
    SCREEN   - INTERNAL SCREEN DEFINITIONS
    FUNCTS   - FUNCTION DEFINITIONS
    CTLCHR   - CONTROL CHARACTERS
    DEVICE   - PHYSICAL DEVICE DATA STRUCTURE

ROUTINES CALLED:

    ROW
    COL
    BLDMSG/BLDBUF - BUILD BUFFER
    SPRINTF
    STRLEN
    MEMCPY
    BLDMSG/REDOFF - READ FLAG TURNED OFF
    BVTIDS   - BUILD VTI DATA STRUCTURE

CALLED DIRECTLY BY:

    GETVT   - GET DATA FROM VIRTUAL TERMINAL

USED IN MAIN PROGRAM(S):

    DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: BLDMSG/BLDBUF
PURPOSE: BUILD BUFFER
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: BLDMSG
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

  SYNOPSIS
     STATIC VOID BLDBUF(WNDPT, BUFPTR, BUFEND)
        REGISTER WND *WNDPT;
        REGISTER CHAR **BUFPTR;
        CHAR   *BUFEND;

     INPUTS/OUTPUTS:

     INPUTS:
        WNDPT - POINTER TO WINDOW FROM WHICH TO GET INFO TO
                         PUT IN MESSAGE
        BUFPTR - ADDRESS OF POINTER WHERE FORMATED MESSAGE TO
                         BE PUT
        BUFEND - END OF THIS MEMORY AREA

     OUTPUTS:
        BUFPTR - POINTS TO LAST ENTERY OF FORMATED MESSAGE

   DESCRIPTION
        THIS MODULE BUILDS A FORMATED MESSAGE(TO BE SENT ACROSS
                         NTM TO MONITOR)
        FROM WINDOW POINTED TO BY WNDPT

ARGUMENTS:

   WNDPT =   WND *
   BUFPTR =   CHAR **
   BUFEND =   CHAR *

INCLUDE FILES:

```
STDTYP      - STANDARD TYPE DEFINITIONS
BITS        - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
SCREEN      - INTERNAL SCREEN DEFINITIONS
FUNCTS      - FUNCTION DEFINITIONS
CTLCHR      - CONTROL CHARACTERS
DEVICE      - PHYSICAL DEVICE DATA STRUCTURE
```

ROUTINES CALLED:

```
BLDMSG/BLDBUF - BUILD BUFFER
MEMCPY
STRLEN
SPRINTF
```

CALLED DIRECTLY BY:

```
BLDMSG/BLDBUF - BUILD BUFFER
BLDMSG        - BUILD MESSAGE
```

USED IN MAIN PROGRAM(S):

```
DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
```

VIRTUAL TERMINAL Module Documentation

NAME: BLDMSG/REDOFF
PURPOSE: READ FLAG TURNED OFF
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: BLDMSG
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

  SYNOPSIS
     STATIC VOID REDOFF(WNDPT)
        REGISTER WND *WNDPT;

     INPUTS/OUTPUTS:

     INPUTS:
        WNDPT - POINTER TO WINDOW FROM WHICH DATA WAS READ

     OUTPUTS:
        NONE

  DESCRIPTION
     THIS MODULE TURNS OFF ALL READ FLAGS OF CHILD WINDOWS AND
                       FIELDS WHOSE
     DATA HAS BEEN PUT IN FORMATED MESSAGE(TO BE SENT ACROSS
                       NTM TO MONITOR)
     OF WINDOW POINTED TO BY WNDPT

ARGUMENTS:

  WNDPT -   WND *

INCLUDE FILES:

  STDTYP   - STANDARD TYPE DEFINITIONS
  BITS   - INCLUDE FILE FOR BIT MANIPULATION ROUTINES

```
SCREEN     - INTERNAL SCREEN DEFINITIONS
FUNCTS     - FUNCTION DEFINITIONS
CTLCHR     - CONTROL CHARACTERS
DEVICE     - PHYSICAL DEVICE DATA STRUCTURE
```

ROUTINES CALLED:

```
  BLDMSG/REDOFF - READ FLAG TURNED OFF
```

CALLED DIRECTLY BY:

```
  BLDMSG/REDOFF - READ FLAG TURNED OFF
  BLDMSG      - BUILD MESSAGE
```

USED IN MAIN PROGRAM(S):

```
  DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
```

VIRTUAL TERMINAL Module Documentation

NAME: BVTIDS
PURPOSE: BUILD VTI DATA STRUCTURE
LANGUAGE: C
MODULE TYPE: FUNCTION
FUNCTION TYPE: BOOL ()
SOURCE FILE: BVTIDS
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

  SYNOPSIS
     BOOL BVTIDS()

     INPUTS/OUTPUTS:

     INPUTS:
       NONE

     OUTPUTS:
       RETURNS SUCCESS/FAILURE

  DESCRIPTION
     THIS MODULE (AND STATIC SUBMODULES) BUILDS THE VTI FIELD
                    MAP USED BY
     VIRTUAL TERMINAL TO PAINT SCREEN ON TERMINAL(DEVICE) FROM
                    THE INTERNAL
     DATA STRUCTURE.

INCLUDE FILES:

  STDTYP   - STANDARD TYPE DEFINITIONS
  BITS   - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
  FUNCTS   - FUNCTION DEFINITIONS
  SCREEN   - INTERNAL SCREEN DEFINITIONS
  DEVICE   - PHYSICAL DEVICE DATA STRUCTURE

ROUTINES CALLED:

  BLDCMD
  PRCCMDS   - PROCESS COMMAND
  BVTIDS/CLRFLG - CLEAR FLAGS
  ROW
  COL
  ABSPOS   - ABSOLUTIZE CURSOR POSITION OF FIELD
  MAX
  STRASN
  MEMCMP
  BVTIDS/RVTIFM - REBUILD VTI FIELD MAP

CALLED DIRECTLY BY:

  BLDMSG   - BUILD MESSAGE
  PUTVT   - PUT DATA TO VIRTUAL TERMINAL

USED IN MAIN PROGRAM(S):

  DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: BVTIDS/BVTIFM
PURPOSE: BUILD VTI FIELD MAP
LANGUAGE: C
MODULE TYPE: FUNCTION
FUNCTION TYPE: BOOL ()
SOURCE FILE: BVTIDS
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

  DESCRIPTION
      TRAVERSES THE INTERNAL STRUCTURE ADDING WINDOWS AND
                      FIELDS TO THE
      FIELD MAP

ARGUMENTS:

  WNDPT =   WND *
  BNI   =   INT []

INCLUDE FILES:

  STDTYP   - STANDARD TYPE DEFINITIONS
  BITS   - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
  FUNCTS   - FUNCTION DEFINITIONS
  SCREEN   - INTERNAL SCREEN DEFINITIONS
  DEVICE   - PHYSICAL DEVICE DATA STRUCTURE

ROUTINES CALLED:

  BVTIDS/BVTIFM - BUILD VTI FIELD MAP
  BVTIDS/INSFLD - INSERT FIELD
  MALLOC

CALLED DIRECTLY BY:

BVTIDS/RVTIFM - REBUILD VTI FIELD MAP
BVTIDS/BVTIFM - BUILD VTI FIELD MAP

USED IN MAIN PROGRAM(S):

  DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: BVTIDS/CLRFLG
PURPOSE: CLEAR FLAGS
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: BVTIDS
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

  DESCRIPTION
      THIS MODULE CLEARS ALL FORMAT CHANGE AND CHANGE OUTPUT
                      FLAGS

ARGUMENTS:

  WNDPT =   WND *

INCLUDE FILES:

    STDTYP   - STANDARD TYPE DEFINITIONS
    BITS   - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
    FUNCTS   - FUNCTION DEFINITIONS
    SCREEN   - INTERNAL SCREEN DEFINITIONS
    DEVICE   - PHYSICAL DEVICE DATA STRUCTURE

ROUTINES CALLED:

  BVTIDS/CLRFLG - CLEAR FLAGS

CALLED DIRECTLY BY:

    BVTIDS/CLRFLG - CLEAR FLAGS
    BVTIDS   - BUILD VTI DATA STRUCTURE

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: BVTIDS/CVTIFM
PURPOSE: CLEAR VTI FIELD MAP
LANGUAGE: C
MODULE TYPE: FUNCTION
FUNCTION TYPE: BOOL ()
SOURCE FILE: BVTIDS
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

  DESCRIPTION
      REMOVES ALL OLD VTI FIELDS FROM THE MAP AND FREES THEM

INCLUDE FILES:

    STDTYP   - STANDARD TYPE DEFINITIONS
    BITS   - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
    FUNCTS   - FUNCTION DEFINITIONS
    SCREEN   - INTERNAL SCREEN DEFINITIONS
    DEVICE   - PHYSICAL DEVICE DATA STRUCTURE

ROUTINES CALLED:

    STRASN
    MALLOC
    FREE

CALLED DIRECTLY BY:

  BVTIDS/RVTIFM - REBUILD VTI FIELD MAP

USED IN MAIN PROGRAM(S):

  DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: BVTIDS/INSFLD
PURPOSE: INSERT FIELD
LANGUAGE: C
MODULE TYPE: FUNCTION
FUNCTION TYPE: BOOL ()
SOURCE FILE: BVTIDS
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:
- - - - - - - - - - - -

  DESCRIPTION
      INSERTS A FIELD (OR WINDOW) INTO THE FIELD MAP TAKING
                        CARE TO TRUNCATE,
      SPLIT, ORREMOVE FIELDS ALREADY IN THE FIELD MAP WHICH ARE
                        PARTIALLY OR
      TOTALLY OBSCURED BY THE NEW FIELD. NOTE THAT THIS
                        ASSUMES FIELDS ARE
      INSERTED IN A BACK-TO-FRONT ORDER.

ARGUMENTS:
- - - - - - - - - -

  IVTIPT =   VTIFLD *
  WBNDRY =   INT []

INCLUDE FILES:
- - - - - - - - - - - - - -

     STDTYP   - STANDARD TYPE DEFINITIONS
     BITS   - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
     FUNCTS   - FUNCTION DEFINITIONS
     SCREEN   - INTERNAL SCREEN DEFINITIONS
     DEVICE   - PHYSICAL DEVICE DATA STRUCTURE

ROUTINES CALLED:
- - - - - - - - - - - - - - - -

  STRASN
  MALLOC
  FREE

MIN
MAX

CALLED DIRECTLY BY:

  BVTIDS/BVTIFM - BUILD VTI FIELD MAP

USED IN MAIN PROGRAM(S):

  DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: BVTIDS/RVTIFM
PURPOSE: REBUILD VTI FIELD MAP
LANGUAGE: C
MODULE TYPE: FUNCTION
FUNCTION TYPE: BOOL ()
SOURCE FILE: BVTIDS
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

  DESCRIPTION
      REBUILD VTI FIELD MAP

INCLUDE FILES:

    STDTYP   - STANDARD TYPE DEFINITIONS
    BITS   - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
    FUNCTS   - FUNCTION DEFINITIONS
    SCREEN   - INTERNAL SCREEN DEFINITIONS
    DEVICE   - PHYSICAL DEVICE DATA STRUCTURE

ROUTINES CALLED:

    BVTIDS/BVTIFM - BUILD VTI FIELD MAP
    BVTIDS/CVTIFM - CLEAR VTI FIELD MAP

CALLED DIRECTLY BY:

    BVTIDS   - BUILD VTI DATA STRUCTURE

USED IN MAIN PROGRAM(S):

    DRIVER MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: CLRMOD
PURPOSE: CLEAR MODIFY FLAGS
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ( )
SOURCE FILE: CLRMOD
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

  SYNOPSIS
     VOID CLRMOD( )

  DESCRIPTION
     CLEARS ALL THE MODIFY FLAGS IN THE INTERNAL SCREEN

INCLUDE FILES:

   STDTYP   - STANDARD TYPE DEFINITIONS
   BITS   - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
   SCREEN   - INTERNAL SCREEN DEFINITIONS

ROUTINES CALLED:

   CBIT

CALLED DIRECTLY BY:

   GETVT   - GET DATA FROM VIRTUAL TERMINAL
   PUTVT   - PUT DATA TO VIRTUAL TERMINAL

USED IN MAIN PROGRAM(S):

   DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: DEFFLD
PURPOSE: DEFINE FIELD
LANGUAGE: C
MODULE TYPE: FUNCTION
FUNCTION TYPE: BOOL ()
SOURCE FILE: DEFFLD
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:
- - - - - - - - - - - -

  SYNOPSIS
     BOOL DEFFLD(CMD,PTR)
       STRUCT COMMAND *CMD;
       CHAR   *PTR;

     INPUTS/OUTPUTS:

     INPUTS:
        CMD - ADDRESS OF COMMAND STRUCTURE USED TO MODIFY DATA
                      STRUCTURE
        PTR   POINTS TO END OF MESSAGE BUFFER BEING PROCESSED

     OUTPUTS
        PTR   WILL POINT TO END PROCESSED DATA IN BUFFER
        RETURNS SUCCESS / FAILURE

  DESCRIPTION
        THIS MODULE USING DATA IN COMMAND STRUCTURE AS WELL AS
                      DATA STILL IN
        MESSAGE BUFFER MODIFIES INTERNAL DATA STRUCTURE OF FIELD
                      SPECIFIED BY
        CURRENT WNDOW AND ROW AND COL OF FIELD FIELD BEING DEFINED
                      IF NO FIELD
        IS FOUND TO MODIFY THEN ONE IS CREATED.

  ARGUMENT

```
----------
```

```
CMD  =        STRUCT COMMAND *
PTR  =        CHAR **
```

INCLUDE FILES:

```
---------------
```

```
STDTYP    - STANDARD TYPE DEFINITIONS
CTYPE     - **** PURPOSE NOT FOUND BY STRIPPER ****
BITS      - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
FUNCTS    - FUNCTION DEFINITIONS
DEVICE    - PHYSICAL DEVICE DATA STRUCTURE
```

ROUTINES CALLED:

```
-----------------
```

```
CALLOC
MALLOC
MEMSET
ISPRINT
```

CALLED DIRECTLY BY:

```
----------------------
```

```
PUTVT     - PUT DATA TO VIRTUAL TERMINAL
```

USED IN MAIN PROGRAM(S):

```
--------------------------
```

```
DRIVER MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
```

VIRTUAL TERMINAL Module Documentation

NAME   DEFWND
PURPOSE   DEFINE WINDOW
LANGUAGE   C
MODULE TYPE   FUNCTION
FUNCTION TYPE   BOOL ( )
SOURCE FILE   DEFWND
SOURCE FILE TYPE   .C
HOST
SUBSYSTEM   UI
SUBDIRECTORY   DRIVER
DOCUMENTATION GROUP   VIRTERM

DESCRIPTION

    SYNOPSIS
        BOOL DEFWND(CMD)
            STRUCT COMMAND *CMD;

        INPUTS OUTPUTS

        INPUT
            CMD   ADDRESS OF COMMAND STRUCTURE USED TO MODIFY DATA
                        STRUCTURE

        OUTPUTS
            RETURNS SUCCESS   FAILURE

    DESCRIPTION
        THIS MODULE USING DATA IN COMMAND STRUCTURE MODIFIES
                        INTERNAL DATA
        STRUCTURE OF WINDOW SPECIFIED BY CURENT WNDOW AND WNDID
                        OF WINDOW
        IF NO DEFINED IF NO WINDOW IS FOUND TO MODIFY THEN ONE
                        IS CREATED

ARGUMENT

    CM   STRUCT COMMAND *

INCLUDE FILES:
- - - - - - - - - - - - - -

    STDTYP   - STANDARD TYPE DEFINITIONS
    BITS   - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
    FUNCTS   - FUNCTION DEFINITIONS
    DEVICE   - PHYSICAL DEVICE DATA STRUCTURE

ROUTINES CALLED:
- - - - - - - - - - - - - - - - -

    FNDWND   - FIND WINDOW
    CALLOC
    MAX
    MIN
    STFMTF   - SET FORMAT FLAG FOR ALL CHILDREN WINDOWS AND
                         FIELDS

CALLED DIRECTLY BY:
- - - - - - - - - - - - - - - - - - - -

    PUTVT   - PUT DATA TO VIRTUAL TERMINAL

USED IN MAIN PROGRAM(S):
- -

    DRIVER MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME.   DOSCR/ERASE
PURPOSE: ERASE PART OF SCREEN
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: DOSCR
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY.   DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:
- - - - - - - - - - - -

ARGUMENTS:
- - - - - - - - - - -

   LO =   INT
   HI =   INT

INCLUDE FILES:
- - - - - - - - - - - - -

   STDTYP   - STANDARD TYPE DEFINITIONS
   BITS   - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
   FUNCTS   - FUNCTION DEFINITIONS
   SCREEN   - INTERNAL SCREEN DEFINITIONS

ROUTINES CALLED:
- - - - - - - - - -

   EXIT

   CALLED BY:

       HORIZONTAL SCROLL
       VERTICAL SCROLL
       DO COMMAND TO INTERNAL SCREEN

USED IN MAIN PROGRAM(S):

   DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: DOSCR/HSCR
PURPOSE: HORIZONTAL SCROLL
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: DOSCR
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:
- - - - - - - - - - - -

ARGUMENTS:
- - - - - - - - - -

    POS =   INT
    DIR =   INT
    N =   INT*

INCLUDE FILES:
- - - - - - - - - - - - - - -

    STDTYP   - STANDARD TYPE DEFINITIONS
    BITS   - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
    FUNCTS   - FUNCTION DEFINITIONS
    SCREEN   - INTERNAL SCREEN DEFINITIONS

ROUTINES CALLED:
- - - - - - - - - - - - - -

    DOSCR ERASE - ERASE PART OF SCREEN
    MIN
    COL
    TBIT

CALLED DIRECTLY BY:
- - - - - - - - - - - - - - - - -

    DOSCREEN   - DO COMMAND TO INTERNAL SCREEN

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

```
NAME:                   DOSCR/VSCR
PURPOSE:                VERTICAL SCROLL
LANGUAGE:               C
MODULE TYPE:            SUBROUTINE
FUNCTION TYPE:          VOID ()
SOURCE FILE:            DOSCR
SOURCE FILE TYPE:       .C
HOST:
SUBSYSTEM:              UI
SUBDIRECTORY:           DRIVER
DOCUMENTATION GROUP:    VIRTERM
```

DESCRIPTION:

ARGUMENTS:

```
  POS =        INT
  N =          INT
```

INCLUDE FILES:

```
  STDTYP      - STANDARD TYPE DEFINITIONS
  BITS        - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
  FUNCTS      - FUNCTION DEFINITIONS
  SCREEN      - INTERNAL SCREEN DEFINITIONS
```

ROUTINES CALLED:

```
  SBIT
  MAX
  DOSCR/ERASE - ERASE PART OF SCREEN
  ROW
  MIN
  COL
  CBIT
  TBIT
```

CALLED DIRECTLY BY:

DOSCREEN   - DO COMMAND TO INTERNAL SCREEN

USED IN MAIN PROGRAM(S):

  DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: DOSCREEN
PURPOSE: DO COMMAND TO INTERNAL SCREEN
LANGUAGE: C
MODULE TYPE: FUNCTION
FUNCTION TYPE: INT ()
SOURCE FILE: DOSCR
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:
- - - - - - - - - - - -

   SYNOPSIS
      INT DOSCREEN(CMD)
         STRUCT COMMAND *CMD;

   DESCRIPTION
      EXECUTES CMD ON THE INTERNAL SCREEN AND FIXES UP ITS
                     PARAMETERS.
      RETURNS -1 FOR ERRORS, 0 FOR NO ACTION, 1 FOR NORMAL
                     COMMAND, AND 2 FOR
      MOVE THE CURSOR AND RETRY.

ARGUMENTS:
- - - - - - - - - -

   CMD =   STRUCT COMMAND *

INCLUDE FILES:
- - - - - - - - - - - - - -

   STDTYP   - STANDARD TYPE DEFINITIONS
   BITS   - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
   FUNCTS   - FUNCTION DEFINITIONS
   SCREEN   - INTERNAL SCREEN DEFINITIONS

ROUTINES CALLED:
- - - - - - - - - - - - - - - -

   TBIT
   CBIT

FFBSA
DOSCR/HSCR - HORIZONTAL SCROLL
COL
MAX
FFBSB
ROW
DOSCR/VSCR - VERTICAL SCROLL
DOSCR/ERASE - ERASE PART OF SCREEN
FIX
LIMIT
POS
CABIT
FLOOR
SBIT
ZERO

CALLED DIRECTLY BY:

    PRCCMDS   - PROCESS COMMAND
    TRMGET   - TERMINAL GET

USED IN MAIN PROGRAM(S):

    DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: DRIVER/MAIN
PURPOSE: MAIN MODULE FOR WINDOW MANAGER AND DEVICE
                         DRIVER
LANGUAGE: C
MODULE TYPE: FUNCTION
FUNCTION TYPE: INT ()
SOURCE FILE: DRIVER
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DEVDRV
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

  SYNOPSIS
    MAIN( )

  DESCRIPTION
    THIS IS THE MAIN MODULE FOR WINDOW MANAGER AND DEVICE
                    DRIVER. IT SITS
    IN A POOLING LOOP GETTING MESSAGES FOM NTN AND PROCESSING
                    THEM AND
    GETTING TERMINAL INPUT AND PROCESSING THAT. WHEN RUN,
                    THREE OPTIONAL
    ARGUMENTS MAY BE SPECIFIED FOR SCRIPTING: -W‹FILE› TO
                    WRITE A SCRIPT
    FILE, -R‹FILE› TO READ A SCRIPT FILE, AND -S‹FILE› TO
                    SAVE OUTPUT IN A
    FILE.

ARGUMENTS:

  ARGC =   INT
  ARGV =   CHAR * []

INCLUDE FILES:

  STDTYP   - STANDARD TYPE DEFINITIONS
  STDIO   - **** PURPOSE NOT FOUND BY STRIPPER ****
  TERMIO   - TRANSPARENT TERMINAL I/O DEFINITIONS

DEVICE	- PHYSICAL DEVICE DATA STRUCTURE
DEVINI	- DEVICE INITIALIZATIONS
NTM	- NTM INTERFACE INCLUDE FILE
BITS	- INCLUDE FILE FOR BIT MANIPULATION ROUTINES
FUNCTS	- FUNCTION DEFINITIONS
SCREEN	- INTERNAL SCREEN DEFINITIONS
CTLCHR	- CONTROL CHARACTERS
SIGNAL	- **** PURPOSE NOT FOUND BY STRIPPER ****
TRMRTN	- TERMINAL (DEVICE DRIVER) ROUTINES

ROUTINES CALLED:

BLDCMD	
TVTPRC	- TERMINATE VTI PROCESS
INITEX	
MEMCMP	
PUTVT	- PUT DATA TO VIRTUAL TERMINAL
FPRINTF	
PRINTF	
TRMNAT	
EXIT	
INTVT	- INITIALIZE VIRTUAL TERMINAL
CALLOC	
MALLOC	
FATAL	- REPORT FATAL ERROR
DELAY	
TRMVT	- TERMINATE VIRTUAL TERMINAL
RCV	
TRMCHK	- TERMINAL CHECK
GETVT	- GET DATA FROM VIRTUAL TERMINAL
SIGNAL	
MEMCPY	
STRCPY	
FREE	
STRCAT	
SPRINTF	
STRLEN	
NSEND	
FWRITE	
MIN	
PUTC	
FCLOSE	
FSEARCH	
FOPEN	
PRCCMDS	- PROCESS COMMAND
TOLOWER	

VIRTUAL TERMINAL Module Documentation

NAME: ERAWND
PURPOSE: ERASE WINDOW
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: ERAWND
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

  SYNOPSIS
     VOID ERAWND(WNDPT)
        WND *WNDPT:

     INPUTS OUTPUTS:

     INPUTS:
       WNDPT - POINTER TO WINDOW WISH TO FREE

     OUTPUTS:
       NONE

  DESCRIPTION
     THIS MODULE FREES ALL WINDOW'S CHILDREN WINDOWS AS WELL
                      AS ALL
     DEPENDENT FIELDS.

ARGUMENTS:

  WNDPT =   WND *

INCLUDE FILES:

  STDTYP   - STANDARD TYPE DEFINITIONS
  BITS   - INCLUDE FILE FOR BIT MANIPULATION ROUTINES

DEVICE   - PHYSICAL DEVICE DATA STRUCTURE

ROUTINES CALLED:

  ERAWND   - ERASE WINDOW
  FREE

CALLED DIRECTLY BY:

  ERAWND   - ERASE WINDOW
  PUTVT   - PUT DATA TO VIRTUAL TERMINAL
  RMVWND   - REMOVE WINDOW

USED IN MAIN PROGRAM(S):

  DRIVER MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME   FATAL
PURPOSE   REPORT FATAL ERROR
LANGUAGE.   C
MODULE TYPE   SUBROUTINE
FUNCTION TYPE   VOID ()
SOURCE FILE   FATAL
SOURCE FILE TYPE   .C
HOST
SUBSYSTEM   UI
SUBDIRECTORY   DRIVER
DOCUMENTATION GROUP   VIRTERM

DESCRIPTION
- - - - - - - -   -

   SYNOPSIS
      VOID FATAL(MSG)
         CHAR MSG[]

      INPUTS
         MSG - ERROR MESSAGE TO BE DISPLAYED (ERROR - %S\N)

   DESCRIPTION
      DISPLAYS THE SPECIFIED ERROR MESSAGE AND EXITS.

ARGUMENTS
- - - - - - - - - -

   MSG =   CHAR []

INCLUDE FILES
- - - - - - - - - - - - -

   STDTYP   STANDARD TYPE DEFINITIONS
   STDIO   **** PURPOSE NOT FOUND BY STRIPPER ****

ROUTINES CALLED
- - - - - - - - - - - - - - - - -

   TVTPRC   TERMINATE VTI PROCESS
   PRINTF

CALLED DIRECTLY BY:

   DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

USED IN MAIN PROGRAM(S):

   DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: FNDWND
PURPOSE: FIND WINDOW
LANGUAGE: C
MODULE TYPE: FUNCTION
FUNCTION TYPE: WND * ()
SOURCE FILE: FNDWND
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

  SYNOPSIS
     WND *FNDWND(WNDID,FWNDPT)
       REGISTER INT WNDID;
       REGISTER WND *FWNDPT;

     INPUTS/OUTPUTS:

     INPUTS:
       WNDID - ID OF WINDOW SEARCHING FOR
       FWNDPT - POINTER TO FIRST WNDOW IN LIST TO BE SEARCHED

     OUTPUTS:
       RETURNS A POINTER TO WINDOW FOUND OR A NULL

  DESCRIPTION
       THIS MODULE SEARCHES FOR A WNDOW WITH THE ID GIVEN AND
                        EITHER RETURNS
       A POINTER TO THE WINDOW FOUND OR A NULL.

ARGUMENTS:

  WNDID =   INT
  FWNDPT =   WND *

INCLUDE FILES:

```
    --------------
```
    STDTYP   - STANDARD TYPE DEFINITIONS
    DEVICE   - PHYSICAL DEVICE DATA STRUCTURE

ROUTINES CALLED:
```
    ----------------
```
    FNDWND   - FIND WINDOW

CALLED DIRECTLY BY:
```
    ------------------
```
    DEFWND   - DEFINE WINDOW
    FNDWND   - FIND WINDOW
    PUTVT   - PUT DATA TO VIRTUAL TERMINAL
    RMVWND   - REMOVE WINDOW

USED IN MAIN PROGRAM(S):
```
    ------------------------
```
    DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: GETVT
PURPOSE: GET DATA FROM VIRTUAL TERMINAL
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: GETVT
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:
- - - - - - - - - - - -

  SYNOPSIS
      VOID GETVT(BUFF, MAXLEN, LEN)
          CHAR *BUFF;
          INT *MAXLEN, *LEN;

  DESCRIPTION
      PERFORMS A READ FROM THE VIRTUAL TERMINAL. IF IN FORMS
                      MODE, BUFF
      WILL CONTAIN A FORMATTED SCREEN, OTHERWISE IT WILL
                      CONSIST OF ALL THE
      PRINTABLE CHARACTERS ENTERED PRIOR TO A COMMAND; IF IN
                      CONTROL TRANSFER
      MODE, THE COMMAND WILL ALSO BE STORED. MAXLEN IS THE
                      LENGTH OF BUFF.
      LEN IS THE NUMBER OF CHARACTER READ IN.

ARGUMENTS:
- - - - - - - - - -

  BUFF =   CHAR *
  MAXLEN -   INT *
  LEN =   INT *

INCLUDE FILES
- - - - - - - - - - -

  STDTYP   STANDARD TYPE DEFINITIONS
  BITS   INCLUDE FILE FOR BIT MANIPULATION ROUTINES
  FUNCTS   FUNCTION DEFINITIONS

SCREEN   - INTERNAL SCREEN DEFINITIONS
DEVICE   - PHYSICAL DEVICE DATA STRUCTURE
TRMRTN   - TERMINAL (DEVICE DRIVER) ROUTINES

ROUTINES CALLED:

BLDCMD
CLRMOD   - CLEAR MODIFY FLAGS
TBIT
PVTICMD   - PUT VTI COMMAND
TRMGET   - TERMINAL GET
PCHVTI   - PUT SCREEN CHARACTERS TO VTI DATA STRUCTURE
BLDMSG   - BUILD MESSAGE

CALLED DIRECTLY BY:

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: GVTICMD
PURPOSE: GET VIRTUAL TERMINAL INTERFACE COMMAND
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: GVTICMD
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:
- - - - - - - - - - - -

  SYNOPSIS
      VOID GVTICMD(CMD, PTR, END)
          STRUCT COMMAND *CMD;
          CHAR **PTR, *END;

  DESCRIPTION
      PARSES THE NEXT VIRTUAL TERMINAL COMMAND INTO CMD AND
                        UPDATES PTR TO
      POINT TO THE CHARACTER FOLLOWING IT. END IS A POINTER TO
                        THE CHARACTER
      FOLLOWING THE END OF THE COMMAND STRING.

ARGUMENTS:
- - - - - - - - -

    CMD =   STRUCT COMMAND *
    PTR =   CHAR **
    END =   CHAR *

INCLUDE FILES
- - - - - - - - - - -

    STDTYP   STANDARD TYPE DEFINITIONS
    CTYPE   **** PURPOSE NOT FOUND BY STRIPPER ****
    BITS   INCLUDE FILE FOR BIT MANIPULATION ROUTINES
    FUNCTS   FUNCTION DEFINITIONS
    CTLCHR   CONTROL CHARACTERS

ROUTINES CALLED:

  ISPRINT
  ISDIGIT

CALLED DIRECTLY BY:

  PUTVT   - PUT DATA TO VIRTUAL TERMINAL

USED IN MAIN PROGRAM(S):

  DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: INTVT
PURPOSE: INITIALIZE VIRTUAL TERMINAL
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: INTVT
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

    SYNOPSIS
        VOID INTVT(TNAME, LEN)
            CHAR *TNAME;
            INT *LEN;

    DESCRIPTION
        OPENS THE VTI FOR THE TERMINAL SPECIFIED BY TNAME. LEN
                        IS THE NUMBER OF
        CHARACTERS IN TNAME.

ARGUMENTS:

    TNAME =   CHAR *
    LEN =   INT *

INCLUDE FILES:

    STDTYP   - STANDARD TYPE DEFINITIONS
    BITS   - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
    SCREEN   - INTERNAL SCREEN DEFINITIONS
    FUNCTS   - FUNCTION DEFINITIONS
    CTLCHR   - CONTROL CHARACTERS
    TRMRTN   - TERMINAL (DEVICE DRIVER) ROUTINES

ROUTINES CALLED:

```
CSTR
MALLOC
FREE
PUTVT       - PUT DATA TO VIRTUAL TERMINAL
TRMINI      - TERMINAL INITIALIZE
```

CALLED DIRECTLY BY:

  DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

USED IN MAIN PROGRAM(S):

  DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: INVIS
PURPOSE: CHECK FOR INVISIBILITY
LANGUAGE: C
MODULE TYPE: FUNCTION
FUNCTION TYPE: BOOL ()
SOURCE FILE: INVIS
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

  SYNOPSIS
     BOOL INVIS(POS)
        INT POS;

  DESCRIPTION
     RETURNS TRUE IF THE CHARACTER AT POSITION POS ON THE
                        INTERNAL SCREEN
     IS INVISIBLE, FALSE OTHERWISE.

ARGUMENTS:

  POS =   INT

INCLUDE FILES:

  STDTYP   - STANDARD TYPE DEFINITIONS
  BITS   - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
  SCREEN   - INTERNAL SCREEN DEFINITIONS

ROUTINES CALLED:

  TBIT

CALLED DIRECTLY BY:

REFRESH   - REFRESH TERMINAL
SLINEND   - FIND SCREEN LINE END

USED IN MAIN PROGRAM(S):

  DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

```
NAME:                  PCHVTI
PURPOSE:               PUT SCREEN CHARACTERS TO VTI DATA
                       STRUCTURE
LANGUAGE:              C
MODULE TYPE:           FUNCTION
FUNCTION TYPE:         BOOL ()
SOURCE FILE:           PCHVTI
SOURCE FILE TYPE:      .C
HOST:
SUBSYSTEM:             UI
SUBDIRECTORY:          DRIVER
DOCUMENTATION GROUP:   VIRTERM
```

DESCRIPTION:

   SYNOPSIS
      BOOL PCHVTI()

      INPUTS/OUTPUTS:

      INPUTS:
        NONE
      OUTPUTS:
        RETURNS FAILURE/SUCCESS

   DESCRIPTION
      THIS MODULE TAKES VT DATA IN "SCREEN" BUFFER AND PUTS IT
                        INTO
      VTI INTERNAL DATA STRUCTURE

INCLUDE FILES:

   STDTYP   - STANDARD TYPE DEFINITIONS
   BITS   - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
   SCREEN   - INTERNAL SCREEN DEFINITIONS
   FUNCTS   - FUNCTION DEFINITIONS
   DEVICE   - PHYSICAL DEVICE DATA STRUCTURE

ROUTINES CALLED:

  TBIT
  ABSPOS   - ABSOLUTIZE CURSOR POSITION OF FIELD
  MAX

CALLED DIRECTLY BY:

  GETVT   - GET DATA FROM VIRTUAL TERMINAL
  PUTVT   - PUT DATA TO VIRTUAL TERMINAL

USED IN MAIN PROGRAM(S):

  DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: PRCCMDS
PURPOSE: PROCESS COMMAND
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: PRCCMDS
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

  SYNOPSIS
    VOID PRCCMDS(CMD)
    STRUCT COMMAND *CMD;

    INPUTS/OUTPUTS:

    INPUTS:
      CMD - COMMAND TO BE PROCESSED

    OUTPUTS:
      NONE

  DESCRIPTION
      PROCESSES INDIVIDUAL VITTUAL TERMINAL COMMANDS

ARGUMENTS:

  CMD =   STRUCT COMMAND *

INCLUDE FILES:

    STDTYP   - STANDARD TYPE DEFINITIONS
    TERMIO   - TRANSPARENT TERMINAL I/O DEFINITIONS
    BITS   - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
    FUNCTS   - FUNCTION DEFINITIONS

```
SCREEN      - INTERNAL SCREEN DEFINITIONS
TRMRTN      - TERMINAL (DEVICE DRIVER) ROUTINES
```

ROUTINES CALLED:

```
BLDCMD
DOSCREEN    - DO COMMAND TO INTERNAL SCREEN
TRMPUT      - TERMINAL PUT
TBIT
ROW
COL
```

CALLED DIRECTLY BY:

```
BVTIDS      - BUILD VTI DATA STRUCTURE
DRIVER/MAI  - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
PUTVT       - PUT DATA TO VIRTUAL TERMINAL
```

USED IN MAIN PROGRAM(S):

```
DRIVER/MAI  - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
```

VIRTUAL TERMINAL Module Documentation

NAME: PUTVT
PURPOSE: PUT DATA TO VIRTUAL TERMINAL
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: PUTVT
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

   SYNOPSIS
      VOID PUTVT(BUFF. LEN)
         CHAR *BUFF;
         INT *LEN;

   DESCRIPTION
      PERFORMS A WRITE TO THE VIRTUAL TERMINAL. LEN IS THE
                        NUMBER OF
      CHARACTERS IN BUFF TO BE WRITTEN.

ARGUMENTS:

   BUFF =   CHAR *
   LEN =   INT *

INCLUDE FILES:

   STDTYP   - STANDARD TYPE DEFINITIONS
   TERMIO   - TRANSPARENT TERMINAL I/O DEFINITIONS
   BITS   - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
   FUNCTS   - FUNCTION DEFINITIONS
   SCREEN   - INTERNAL SCREEN DEFINITIONS
   DEVICE   - PHYSICAL DEVICE DATA STRUCTURE
   TRMRTN   - TERMINAL (DEVICE DRIVER) ROUTINES

ROUTINES CALLED:

```
------------------
  BLDCMD
  FNDWND      - FIND WINDOW
  PRCCMDS     - PROCESS COMMAND
  TBIT
  TRMFLS      - TERMINAL FLUSH
  RMVWND      - REMOVE WINDOW
  DEFWND      - DEFINE WINDOW
  SWNPRC      - SET WINDOW PRECEDENCE
  DEFFLD      - DEFINE FIELD
  BVTIDS      - BUILD VTI DATA STRUCTURE
  ERAWND      - ERASE WINDOW
  PCHVTI      - PUT SCREEN CHARACTERS TO VTI DATA STRUCTURE
  CLRMOD      - CLEAR MODIFY FLAGS
  GVTICMD     - GET VIRTUAL TERMINAL INTERFACE COMMAND
  STRDPN      - SET READ PENDING FLAGS
```

CALLED DIRECTLY BY:

```
  DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
  INTVT       - INITIALIZE VIRTUAL TERMINAL
  TRMVT       - TERMINATE VIRTUAL TERMINAL
```

USED IN MAIN PROGRAM(S):

```
  DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
```

VIRTUAL TERMINAL Module Documentation

NAME   PVTICMD
PURPOSE   PUT VTI COMMAND
LANGUAGE   C
MODULE TYPE   SUBROUTINE
FUNCTION TYPE   VOID ()
SOURCE FILE   PVTICMD
SOURCE FILE TYPE   C
HOST
SUBSYSTEM   UI
SUBDIRECTORY   DRIVER
DOCUMENTATION GROUP   VIRTERM

DESCRIPTION
- - - - - - - - - - -

  SYNOPSIS
      VOID PVTICMD(CMD, BUFF, END)
          STRUCT COMMAND *CMD;
          CHAR **BUF, *END;

  DESCRIPTION
      CONVERTS CMD TO CHARACTER FORM AND UPDATE BUFF TO POINT
                      TO THE CHARACTER
      FOLLOWING THE CONVERTED STRING. END IS A POINTER TO THE
                      CHARACTER
      FOLLOWING THE BUFFER

ARGUMENTS
- - - - - - - - -

  CMD -   STRUCT COMMAND *
  BUFF -   CHAR **
  END -   CHAR *

INCLUDE FILES
- - - - - - - - - - -

  STDTYP   - STANDARD TYPE DEFINITIONS
  BITS   - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
  SCREEN   - INTERNAL SCREEN DEFINITIONS
  FUNCTS   FUNCTION DEFINITIONS
  CTLCHR   - CONTROL CHARACTERS

ROUTINES CALLED:

  PVTICMD/PUTNUM - PUT NUMBER

CALLED DIRECTLY BY:

  GETVT   - GET DATA FROM VIRTUAL TERMINAL

USED IN MAIN PROGRAM(S):

  DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

```
NAME:                    PVTICMD/PUTNUM
PURPOSE:                 PUT NUMBER
LANGUAGE:                C
MODULE TYPE:             SUBROUTINE
FUNCTION TYPE:           VOID ()
SOURCE FILE:             PVTICMD
SOURCE FILE TYPE:        .C
HOST:
SUBSYSTEM:               UI
SUBDIRECTORY:            DRIVER
DOCUMENTATION GROUP:     VIRTERM
```

DESCRIPTION:

ARGUMENTS:

```
  NUM =         INT
  BUFF =        CHAR **
  END =         CHAR *
```

INCLUDE FILES:

```
  STDTYP        - STANDARD TYPE DEFINITIONS
  BITS          - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
  SCREEN        - INTERNAL SCREEN DEFINITIONS
  FUNCTS        - FUNCTION DEFINITIONS
  CTLCHR        - CONTROL CHARACTERS
```

CALLED DIRECTLY BY

```
  PVTICMD       PUT VTI COMMAND
```

USED IN MAIN PROGRAM(S)

```
  DRIVER MAI    MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
```

VIRTUAL TERMINAL Module Documentation

NAME:	REFRESH
PURPOSE:	REFRESH TERMINAL
LANGUAGE:	C
MODULE TYPE:	SUBROUTINE
FUNCTION TYPE:	VOID ()
SOURCE FILE:	REFRESH
SOURCE FILE TYPE:	.C
HOST:	
SUBSYSTEM:	UI
SUBDIRECTORY:	DRIVER
DOCUMENTATION GROUP:	VIRTERM

DESCRIPTION:

  SYNOPSIS
    VOID REFRESH( )

  DESCRIPTION
    CLEARS THE TERMINAL SCREEN AND REWRITES IT FROM THE
                   INTERNAL SCREEN.

INCLUDE FILES:

    STDTYP   - STANDARD TYPE DEFINITIONS
    BITS   - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
    SCREEN   - INTERNAL SCREEN DEFINITIONS
    FUNCTS   - FUNCTION DEFINITIONS
    TRMRTN   - TERMINAL (DEVICE DRIVER) ROUTINES

ROUTINES CALLED:

    BLDCMD
    INVIS   - CHECK FOR INVISIBILITY
    ROW
    COL
    TBIT
    TRMPUT   - TERMINAL PUT
    SBIT
    TRMFLS   - TERMINAL FLUSH
    CBIT

CALLED DIRECTLY BY:

   TRMPUT   - TERMINAL PUT

USED IN MAIN PROGRAM(S):

   DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: REFTERM
PURPOSE: REFRESH TERMINAL
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: REFTERM
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

   SYNOPSIS
      VOID REFTERM(MIN, MAX)
         INT MIN, MAX;

   DESCRIPTION
      REFRESHES THE SPECIFIED PORTION OF THE TERMINAL SCREEN
                      FROM THE INTERNAL
      SCREEN.

ARGUMENTS:

   MIN =   INT
   MAX =   INT

INCLUDE FILES:

   STDTYP   - STANDARD TYPE DEFINITIONS
   BITS   - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
   SCREEN   - INTERNAL SCREEN DEFINITIONS
   FUNCTS   - FUNCTION DEFINITIONS
   TRMRTN   - TERMINAL (DEVICE DRIVER) ROUTINES

ROUTINES CALLED:

   BLDCMD
   TBIT

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TRMPUT   - TERMINAL PUT
SBIT
SLINEND   - FIND SCREEN LINE END
CBIT
COL
ROW
MAX
MIN

CALLED DIRECTLY BY:

   TRMPUT   - TERMINAL PUT

USED IN MAIN PROGRAM(S):

   DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

```
NAME:                   RMVWND
PURPOSE:                REMOVE WINDOW
LANGUAGE:               C
MODULE TYPE:            SUBROUTINE
FUNCTION TYPE:          VOID ()
SOURCE FILE:            RMVWND
SOURCE FILE TYPE:       .C
HOST:
SUBSYSTEM:              UI
SUBDIRECTORY:           DRIVER
DOCUMENTATION GROUP:    VIRTERM
```

DESCRIPTION:

  SYNOPSIS
     VOID RMVWND(WNDID)
       INT WNDID;

     INPUTS/OUTPUTS:

     INPUTS:
       WNDID - ID OF WNDOW WISH TO REMOVE

     OUTPUTS:
       NONE

  DESCRIPTION
     THIS MODULE AFTER CALLING FNDWND TO GET POINTER TO WNDOW
                         INTERESTED IN
     REMOVING, UNLINKS IT FROM DATA STRUCTURE AND CALLS FREWND
                         TO FREE IT
     AND ALL ITS CHILDREN WINDOWS AS WELL AS ALL DEPENDENT
                         FIELDS.

ARGUMENTS:

  WNDID =   INT

INCLUDE FILES:

    STDTYP   - STANDARD TYPE DEFINITIONS
    BITS   - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
    DEVICE   - PHYSICAL DEVICE DATA STRUCTURE

ROUTINES CALLED:

    FNDWND   - FIND WINDOW
    ERAWND   - ERASE WINDOW
    FREE

CALLED DIRECTLY BY:

    PUTVT   - PUT DATA TO VIRTUAL TERMINAL

USED IN MAIN PROGRAM(S):

    DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: SLINEND
PURPOSE: FIND SCREEN LINE END
LANGUAGE: C
MODULE TYPE: FUNCTION
FUNCTION TYPE: INT ()
SOURCE FILE: SLINEND
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

  SYNOPSIS
     INT SLINEND(POS)
         INT POS;

  DESCRIPTION
     RETURNS THE POSITION OF THE LAST VISIBLE CHARACTER ON THE
                         LINE CONTAINING
     THE SPECIFIED POSITION.

ARGUMENTS:

  POS =   INT

INCLUDE FILES:

   STDTYP   - STANDARD TYPE DEFINITIONS
   BITS   - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
   SCREEN   - INTERNAL SCREEN DEFINITIONS

ROUTINES CALLED:

   INVIS   - CHECK FOR INVISIBILITY
   COL

CALLED DIRECTLY BY:

  REFTERM   - REFRESH TERMINAL

USED IN MAIN PROGRAM(S):

  DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: STFMTF
PURPOSE: SET FORMAT FLAG FOR ALL CHILDREN WINDOWS
                         AND FIELDS
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: STFMTF
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

  SYNOPSIS
     VOID STFMTF(WNDPT);
         WND   *WNDPT;

    INPUTS/OUTPUTS:

     INPUTS:
       WNDPT - POINTER TO WINDOW SETTING FLAGS FOR

     OUTPUTS:
       NONE

  DESCRIPTION
     THIS MODULE SETS ALL FORMAT CHANGE FLAGS FOR WINDOW AND
                      ITS CHILDREN
     WINDOWS AND FIELDS

ARGUMENTS:

  WNDPT =   WND *

INCLUDE FILES:

  STDTYP   - STANDARD TYPE DEFINITIONS

```
    BITS        - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
    FUNCTS      - FUNCTION DEFINITIONS
    DEVICE      - PHYSICAL DEVICE DATA STRUCTURE
```

ROUTINES CALLED:

```
    STFMTF      - SET FORMAT FLAG FOR ALL CHILDREN WINDOWS AND
                        FIELDS
```

CALLED DIRECTLY BY:

```
    DEFWND      - DEFINE WINDOW
    STFMTF      - SET FORMAT FLAG FOR ALL CHILDREN WINDOWS AND
                        FIELDS
    SWNPRC      - SET WINDOW PRECEDENCE
```

USED IN MAIN PROGRAM(S):

```
    DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
```

VIRTUAL TERMINAL Module Documentation

NAME: STRDPN
PURPOSE: SET READ PENDING FLAGS
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: STRDPN
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

  SYNOPSIS
     VOID STRDPN(WNDPT)
       REGISTER WND *WNDPT;

     INPUTS/OUTPUTS:

     INPUTS:
       WNDPT - POINTER TO WINDOW FROM WHICH DATA IS TO BE READ

     OUTPUTS:
       NONE

  DESCRIPTION
     THIS MODULE TURNS ON ALL READ FLAGS OF CHILD WINDOWS AND
                       FIELDS WHOSE
     DATA HAS IS TO BE PUT INTO FORMATED MESSAGE(TO BE SENT
                       ACROSS NTM TO
     MONITOR) OF WINDOW POINTED TO BY WNDPT

ARGUMENTS:

  WNDPT =   WND *

INCLUDE FILES:

  STDTYP   - STANDARD TYPE DEFINITIONS

DEVICE   - PHYSICAL DEVICE DATA STRUCTURE

ROUTINES CALLED:

  STRDPN STFDRD - SET FIELD READ PENDING

CALLED DIRECTLY BY:

  PUTVT   - PUT DATA TO VIRTUAL TERMINAL

USED IN MAIN PROGRAM(S):

  DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME   STRDPN STFDRD
PURPOSE   SET FIELD READ PENDING
LANGUAGE   C
MODULE TYPE   SUBROUTINE
FUNCTION TYPE   VOID ( )
SOURCE FILE   STRDPN
SOURCE FILE TYPE   C
HOST
SUBSYSTEM   UI
SUBDIRECTORY   DRIVER
DOCUMENTATION GROUP   VIRTERM

DESCRIPTION
- - - - - - - - - - - -

ARGUMENTS
- - - - - - - - - - -

   WNDPT =   WND •

INCLUDE FILES:
- - - - - - - - - - - - - -

   STDTYP   - STANDARD TYPE DEFINITIONS
   DEVICE   - PHYSICAL DEVICE DATA STRUCTURE

ROUTINES CALLED:
- - - - - - - - - - - - - - - - -

   STRDPN/STFDRD - SET FIELD READ PENDING

CALLED DIRECTLY BY:
- - - - - - - - - - - - - - - - - -

   STRDPN/STFDRD - SET FIELD READ PENDING
   STRDPN   - SET READ PENDING FLAGS

USED IN MAIN PROGRAM(S):
- -

   DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: SWNPRC
PURPOSE: SET WINDOW PRECEDENCE
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ( )
SOURCE FILE: SWNPRC
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:
- - - - - - - - - - - -

  SYNOPSIS
     VOID SWNPRC(CMD)
        STRUCT COMMAND *CMD;

     INPUTS/OUTPUTS.

     INPUTS:
        CMD - ADDRESS OF COMMAND STRUCTURE USED TO SET
                         PRECEDENCE OF
              WINDOWS

     OUTPUTS:
        NONE

  DESCRIPTION
     THIS MODULE REORDERS PRECEDENCE OF WINDOWS, TAKING FIRST
                      WINDOW OUT OF
     LIST ANDPUTING IT AT THE HEAD OF THE LIST, THEN TAKING
                      THE NEXT WINDOW
     AND DOING THE SAME TING AND SO ON UNTIL ALL WINDOW PASSED
                      IN COMMAND
     STRUCTURE HAVE BEEN PROCESSED.

ARGUMENTS:
- - - - - - - - - -

  CMD =   STRUCT COMMAND *

INCLUDE FILES:

   STDTYP   - STANDARD TYPE DEFINITIONS
   BITS   - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
   FUNCTS   - FUNCTION DEFINITIONS
   DEVICE   - PHYSICAL DEVICE DATA STRUCTURE

ROUTINES CALLED:

   STFMTF   - SET FORMAT FLAG FOR ALL CHILDREN WINDOWS AND
                      FIELDS

CALLED DIRECTLY BY:

   PUTVT   - PUT DATA TO VIRTUAL TERMINAL

USED IN MAIN PROGRAM(S):

   DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: TPUTNUM
PURPOSE: TERMINAL PUT NUMBER
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: TPUTNUM
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

   SYNOPSIS
      VOID TPUTNUM(I, CHAN)
         INT I;
         TERM *CHAN;

   DESCRIPTION
      CONVERTS I TO CHARACTER FORM AND WRITES IT TO THE
                        SPECIFIED TERMINAL.

ARGUMENTS:

   I =   INT
   CHAN =   TERM *

INCLUDE FILES:

   STDTYP   - STANDARD TYPE DEFINITIONS
   TERMIO   - TRANSPARENT TERMINAL I/O DEFINITIONS

ROUTINES CALLED:

   TPUTC

CALLED DIRECTLY BY:

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VT100/MOVCUR - MOVE CURSOR (INTERNAL)
VT100/SETATR - SET ATTRIBUTES (INTERNAL)
TRMPUT   - TERMINAL PUT

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: TPUTS
PURPOSE: TERMINAL PUT STRING
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: TPUTS
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

   SYNOPSIS
      VOID TPUTS(S, CHAN)
         CHAR *S;
         TERM *CHAN;

   DESCRIPTION
      WRITES THE SPECIFIED STRING TO THE SPECIFIED TERMINAL.

ARGUMENTS:

   S =   CHAR *
   CHAN =   TERM *

INCLUDE FILES:

   STDTYP   - STANDARD TYPE DEFINITIONS
   TERMIO   - TRANSPARENT TERMINAL I/O DEFINITIONS

ROUTINES CALLED:

   TPUTC

CALLED DIRECTLY BY:

   VT100/MOVCUR - MOVE CURSOR (INTERNAL)

3-118

VT100/SETATR - SET ATTRIBUTES (INTERNAL)
TRMPUT   - TERMINAL PUT
TRMEND   - TERMINAL END

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: TRMCHK
PURPOSE: TERMINAL CHECK
LANGUAGE: C
MODULE TYPE: FUNCTION
FUNCTION TYPE: INT ()
SOURCE FILE: VT100
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DEVDRV
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

  SYNOPSIS
     INT TRMCHK()

  DESCRIPTION
     THIS MODULE RETURNS THE NUMBER OF CHARACTERS IN THE
                   TYPE-AHEAD BUFFER.

INCLUDE FILES:

    STDIO   - **** PURPOSE NOT FOUND BY STRIPPER ****
    STDTYP   - STANDARD TYPE DEFINITIONS
    CTYPE   - **** PURPOSE NOT FOUND BY STRIPPER ****
    TERMIO   - TRANSPARENT TERMINAL I/O DEFINITIONS
    BITS   - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
    SCREEN   - INTERNAL SCREEN DEFINITIONS
    FUNCTS   - FUNCTION DEFINITIONS
    TRMRTN   - TERMINAL (DEVICE DRIVER) ROUTINES
    CI600.C"   - **** PURPOSE NOT FOUND BY STRIPPER ****

ROUTINES CALLED:

   TCHECK

CALLED DIRECTLY BY:

   DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

USED IN MAIN PROGRAM(S):

   DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: TRMEND
PURPOSE: TERMINAL END
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: VT100
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DEVDRV
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

  SYNOPSIS
      VOID TRMEND( )

  DESCRIPTION
      RESETS THE CURRENTLY OPEN TERMINAL AND CLOSES IT.

INCLUDE FILES:

    STDIO   - **** PURPOSE NOT FOUND BY STRIPPER ****
    STDTYP   - STANDARD TYPE DEFINITIONS
    CTYPE   - **** PURPOSE NOT FOUND BY STRIPPER ****
    TERMIO   - TRANSPARENT TERMINAL I/O DEFINITIONS
    BITS   - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
    SCREEN   - INTERNAL SCREEN DEFINITIONS
    FUNCTS   - FUNCTION DEFINITIONS
    TRMRTN   - TERMINAL (DEVICE DRIVER) ROUTINES
    CI600.C"   - **** PURPOSE NOT FOUND BY STRIPPER ****

ROUTINES CALLED:

    PRNEND
    TPUTS   - TERMINAL PUT STRING
    TCLOSE

CALLED DIRECTLY BY:

TRMVT   - TERMINATE VIRTUAL TERMINAL

USED IN MAIN PROGRAM(S):

  DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: TRMFLS
PURPOSE: TERMINAL FLUSH
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: VT100
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DEVDRV
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

  SYNOPSIS
    VOID TRMFLS()

  DESCRIPTION
    FLUSH ANY TERMINAL BUFFERS.

INCLUDE FILES:

  STDIO   - **** PURPOSE NOT FOUND BY STRIPPER ****
  STDTYP   - STANDARD TYPE DEFINITIONS
  CTYPE   - **** PURPOSE NOT FOUND BY STRIPPER ****
  TERMIO   - TRANSPARENT TERMINAL I/O DEFINITIONS
  BITS   - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
  SCREEN   - INTERNAL SCREEN DEFINITIONS
  FUNCTS   - FUNCTION DEFINITIONS
  TRMRTN   - TERMINAL (DEVICE DRIVER) ROUTINES
  CI600.C"   - **** PURPOSE NOT FOUND BY STRIPPER ****

ROUTINES CALLED:

  VT100/MOVCUR - MOVE CURSOR (INTERNAL)
  TFLUSH

CALLED DIRECTLY BY:

  PUTVT   - PUT DATA TO VIRTUAL TERMINAL

REFRESH   - REFRESH TERMINAL
TRMGET   - TERMINAL GET

USED IN MAIN PROGRAM(S):

  DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

```
NAME:                    TRMGET
PURPOSE:                 TERMINAL GET
LANGUAGE:                C
MODULE TYPE:             SUBROUTINE
FUNCTION TYPE:           VOID ()
SOURCE FILE:             VT100
SOURCE FILE TYPE:        .C
HOST:
SUBSYSTEM:               UI
SUBDIRECTORY:            DEVDRV
DOCUMENTATION GROUP:     VIRTERM
```

DESCRIPTION:

    SYNOPSIS
        VOID TRMGET(CMD)
            STRUCT COMMAND *CMD;

    DESCRIPTION
        GETS THE NEXT COMMAND FROM THE TERMINAL AND CONVERTS IT
                       TO INTERNAL FORM.

ARGUMENTS:

    CMD =   STRUCT COMMAND *

INCLUDE FILES:

    STDIO   - **** PURPOSE NOT FOUND BY STRIPPER ****
    STDTYP   - STANDARD TYPE DEFINITIONS
    CTYPE   - **** PURPOSE NOT FOUND BY STRIPPER ****
    TERMIO   - TRANSPARENT TERMINAL I/O DEFINITIONS
    BITS   - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
    SCREEN   - INTERNAL SCREEN DEFINITIONS
    FUNCTS   - FUNCTION DEFINITIONS
    TRMRTN   - TERMINAL (DEVICE DRIVER) ROUTINES
    CI600.C" - **** PURPOSE NOT FOUND BY STRIPPER ****

ROUTINES CALLED:

    BLDCMD

```
    PRINTF
    GETCHAR
    TPURGE
    ISPRINT
    TGETC
    DOSCREEN     - DO COMMAND TO INTERNAL SCREEN
    ROW
    COL
    TRMPUT       - TERMINAL PUT
    TRMFLS       - TERMINAL FLUSH
    TBIT
    ISDIGIT
```

CALLED DIRECTLY BY:

    GETVT   - GET DATA FROM VIRTUAL TERMINAL

USED IN MAIN PROGRAM(S):

    DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME   TRMINI
PURPOSE   TERMINAL INITIALIZE
LANGUAGE   C
MODULE TYPE   SUBROUTINE
FUNCTION TYPE   VOID ()
SOURCE FILE   VT100
SOURCE FILE TYPE   C
HOST
SUBSYSTEM   UI
SUBDIRECTORY   DEVDRV
DOCUMENTATION GROUP   VIRTERM

DESCRIPTION

  SYNOPSIS
     VOID TRMINI(TNAME)
         CHAR *TNAME;

  DESCRIPTION
     OPENS THE TERMINAL SPECIFIED BY TNAME AND INITIALIZES IT.

ARGUMENTS

  TNAME =   CHAR *

INCLUDE FILES:

  STDIO   - **** PURPOSE NOT FOUND BY STRIPPER ****
  STDTYP   - STANDARD TYF_ DEFINITIONS
  CTYPE   - **** PURPOSE NOT FOUND BY STRIPPER ****
  TERMIO   - TRANSPARENT TERMINAL I/O DEFINITIONS
  BITS   - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
  SCREEN   - INTERNAL SCREEN DEFINITIONS
  FUNCTS   - FUNCTION DEFINITIONS
  TRMRTN   - TERMINAL (DEVICE DRIVER) ROUTINES
  CI600.C"   - **** PURPOSE NOT FOUND BY STRIPPER ****

ROUTINES CALLED:

  TBOPEN
  PRNINI

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CALLED DIRECTLY BY:

  INTVT   - INITIALIZE VIRTUAL TERMINAL

USED IN MAIN PROGRAM(S):

  DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: TRMPUT
PURPOSE: TERMINAL PUT
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: VT100
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DEVDRV
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

  SYNOPSIS
      VOID TRMPUT(CMD)
          STRUCT COMMAND *CMD;

  DESCRIPTION
      PUTS AN INTERNAL FORMAT COMMAND TO THE TERMINAL.

ARGUMENTS:

  CMD =   STRUCT COMMAND *

INCLUDE FILES:

  STDIO   - **** PURPOSE NOT FOUND BY STRIPPER ****
  STDTYP   - STANDARD TYPE DEFINITIONS
  CTYPE   - **** PURPOSE NOT FOUND BY STRIPPER ****
  TERMIO   - TRANSPARENT TERMINAL I/O DEFINITIONS
  BITS   - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
  SCREEN   - INTERNAL SCREEN DEFINITIONS
  FUNCTS   - FUNCTION DEFINITIONS
  TRMRTN   - TERMINAL (DEVICE DRIVER) ROUTINES
  CI600.C" - **** PURPOSE NOT FOUND BY STRIPPER ****

ROUTINES CALLED:

  GETCHAR
  PRINTF

```
    PRNFLS
    PRNPUT
    REFTERM    - REFRESH TERMINAL
    TPUTNUM    - TERMINAL PUT NUMBER
    POS
    TPUTS      - TERMINAL PUT STRING
    REFRESH    - REFRESH TERMINAL
    ROW
    COL
    TPUTC
    VT100/SETATR - SET ATTRIBUTES (INTERNAL)
    SBIT
    FFBSA
    CABIT
    FFBDA
    VT100/MOVCUR - MOVE CURSOR (INTERNAL)
    TBIT
```

CALLED DIRECTLY BY:

```
    PRCCMDS    - PROCESS COMMAND
    REFRESH    - REFRESH TERMINAL
    REFTERM    - REFRESH TERMINAL
    TRMGET     - TERMINAL GET
```

USED IN MAIN PROGRAM(S):

```
    DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
```

VIRTUAL TERMINAL Module Documentation

NAME: TRMVT
PURPOSE: TERMINATE VIRTUAL TERMINAL
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: TRMVT
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

  SYNOPSIS
     VOID TRMVT()

  DESCRIPTION
     CLOSES THE VTI.

INCLUDE FILES:

    STDTYP   - STANDARD TYPE DEFINITIONS
    BITS   - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
    SCREEN   - INTERNAL SCREEN DEFINITIONS
    FUNCTS   - FUNCTION DEFINITIONS
    CTLCHR   - CONTROL CHARACTERS
    TRMRTN   - TERMINAL (DEVICE DRIVER) ROUTINES

ROUTINES CALLED:

    TRMEND   - TERMINAL END
    FREE
    PUTVT   - PUT DATA TO VIRTUAL TERMINAL

CALLED DIRECTLY BY:

    DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
    TVTPRC   - TERMINATE VTI PROCESS

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: TVTPRC
PURPOSE: TERMINATE VTI PROCESS
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: TVTPRC
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

  SYNOPSIS
    VOID TVTPRC()

  DESCRIPTION
    THIS IS AN EXIT HANDLER FOR ABNORMAL TERMINATIONS

INCLUDE FILES:

  STDTYP   - STANDARD TYPE DEFINITIONS

ROUTINES CALLED:

  TRMNAT
  TRMVT   - TERMINATE VIRTUAL TERMINAL
  EXIT

CALLED DIRECTLY BY:

  DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
  FATAL   - REPORT FATAL ERROR

USED IN MAIN PROGRAM(S):

  DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

```
NAME:                  VT100/MOVCUR
PURPOSE:               MOVE CURSOR (INTERNAL)
LANGUAGE:              C
MODULE TYPE:           SUBROUTINE
FUNCTION TYPE:         VOID ()
SOURCE FILE:           VT100
SOURCE FILE TYPE:      .C
HOST:
SUBSYSTEM:             UI
SUBDIRECTORY:          DEVDRV
DOCUMENTATION GROUP:   VIRTERM
```

DESCRIPTION:

  SYNOPSIS
    STATIC VOID MOVCUR(NEWPOS)
      INT NEWPOS;

  DESCRIPTION
    MOVES THE TERMINAL CURSOR TO THE SPECIFIED POSITION AND
                    RESETS ANY
    PENDING POSITION.

ARGUMENTS:

  NEWPOS =   INT

INCLUDE FILES:

```
    STDIO     - **** PURPOSE NOT FOUND BY STRIPPER ****
    STDTYP    - STANDARD TYPE DEFINITIONS
    CTYPE     - **** PURPOSE NOT FOUND BY STRIPPER ****
    TERMIO    - TRANSPARENT TERMINAL I/O DEFINITIONS
    BITS      - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
    SCREEN    - INTERNAL SCREEN DEFINITIONS
    FUNCTS    - FUNCTION DEFINITIONS
    TRMRTN    - TERMINAL (DEVICE DRIVER) ROUTINES
    CI600.C"  - **** PURPOSE NOT FOUND BY STRIPPER ****
```


ROUTINES CALLED:

```
TPUTC
TPUTNUM     - TERMINAL PUT NUMBER
TPUTS       - TERMINAL PUT STRING
COL
ROW
```

CALLED DIRECTLY BY:

```
TRMPUT      - TERMINAL PUT
TRMFLS      - TERMINAL FLUSH
```

USED IN MAIN PROGRAM(S):

```
DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
```

VIRTUAL TERMINAL Module Documentation

NAME: VT100/SETATR
PURPOSE: SET ATTRIBUTES (INTERNAL)
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: VT100
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DEVDRV
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

  SYNOPSIS
      VOID SETATR(ATR)
          INT ATR;

  DESCRIPTION
      SETS THE SPECIFIED TERMINAL ATTRIBUTES.

ARGUMENTS:

    ATR =   INT

INCLUDE FILES:

    STDIO   - **** PURPOSE NOT FOUND BY STRIPPER ****
    STDTYP   - STANDARD TYPE DEFINITIONS
    CTYPE   - **** PURPOSE NOT FOUND BY STRIPPER ****
    TERMIO   - TRANSPARENT TERMINAL I/O DEFINITIONS
    BITS   - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
    SCREEN   - INTERNAL SCREEN DEFINITIONS
    FUNCTS   - FUNCTION DEFINITIONS
    TRMRTN   - TERMINAL (DEVICE DRIVER) ROUTINES
    CI600.C"   - **** PURPOSE NOT FOUND BY STRIPPER ****

ROUTINES CALLED:

    TPUTNUM   - TERMINAL PUT NUMBER
    TPUTC

FFBSA
TPUTS   - TERMINAL PUT STRING

CALLED DIRECTLY BY:

  TRMPUT   - TERMINAL PUT

USED IN MAIN PROGRAM(S):

  DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

3.10.9 Include File Descriptio. :

The following list contains a purpose and description of each include file listed in 3.10.4 as specified in the source code. The language it is written in is also given.

VIRTUAL TERMINAL Include File Description

FILE NAME: BITS
PURPOSE: INCLUDE FILE FOR BIT MANIPULATION ROUTINES
LANGUAGE: C

DESCRIPTION:

VIRTUAL TERMINAL Include File Description

FILE NAME: CTLCHR
PURPOSE: CONTROL CHARACTERS
LANGUAGE: C

DESCRIPTION:

    DESCRIPTION
        DEFINITIONS OF ALL CONTROL CHARACTERS TO AVOID CHARACTER
                            SET
        DEPENDENCIES.

VIRTUAL TERMINAL Include File Description

FILE NAME: DEVICE
PURPOSE: PHYSICAL DEVICE DATA STRUCTURE
LANGUAGE: C

DESCRIPTION:

DESCRIPTION
    THIS IS INCLUDE FILE FOR WINDOW MANAGER. IT CONTIANS DATA
                        STRUCTURE
    FOR THE PHYSICAL DEVICE AND ITS LOGICAL DEVICES AND
                        WINDOWS.

VIRTUAL TERMINAL Include File Description

FILE NAME: DEVINI
PURPOSE: DEVICE INITIALIZATIONS
LANGUAGE: C

DESCRIPTION:

   DESCRIPTION
      EXTERNAL DEFINITION AND INITIALIZING INCLUDE FILE FOR
                  DEVICE.H

VIRTUAL TERMINAL Include File Description

FILE NAME: FUNCTS
PURPOSE: FUNCTION DEFINITIONS
LANGUAGE: C

DESCRIPTION:

DESCRIPTION
    DEFINES THE MNEMONIC VIRTUAL TERMINAL COMMAND FUNCTIONS.
    AND DEFINES STRUCTURE FOR PARSING VTI MESSAGE BUFFER.

VIRTUAL TERMINAL Include File Description

FILE NAME: NTM
PURPOSE: NTM INTERFACE INCLUDE FILE
LANGUAGE: C

DESCRIPTION:

DESCRIPTION
INCLUDE FILE FOR NTM INTERFACE

VIRTUAL TERMINAL Include File Description

FILE NAME: SCREEN
PURPOSE: INTERNAL SCREEN DEFINITIONS
LANGUAGE: C

DESCRIPTION:

    DESCRIPTION
        DEFINES SYMBOLS, EXTERNALS, ETC. FOR THE INTERNAL SCREEN
                            BUFFER.

VIRTUAL TERMINAL Include File Description

FILE NAME: STDTYP
PURPOSE: STANDARD TYPE DEFINITIONS
LANGUAGE: C

DESCRIPTION:

    DESCRIPTION
        THIS FILE ENSURES THAT THE FOLLOWING STANDARD TYPES ARE
                        AVAILABLE:
            FLOAT   - SINGLE PRECISION FLOAT
            DOUBLE   - DOUBLE PRECISION FLOAT

            LONG   - 32 BIT (OR LARGER) SIGNED INTEGER
            LBITS   - 32 BITS (OR MORE) FOR BIT MANIPULATION

            INT   - NATURAL SIZE SIGNED INTEGER
            UNSIGNED - NATURAL SIZE UNSIGNED INTEGER
            BOOL   - NATURAL SIZE LOGICAL (ZERO / NON-ZERO ONLY)

            SHORT   - 16 BIT (OR LARGER) SIGNED INTEGER
            USHORT   - 16 BIT (OR LARGER) UNSIGNED INTEGER
            BITS   - 16 BITS (OR MORE) FOR BIT MANIPULATION

            CHAR   - SINGLE MACHINE CHARACTER (REAL CHARACTERS
                        ALWAYS POSITIVE)
            TINY   - 8 BIT (OR LARGER) SIGNED INTEGER
            UTINY   - 8 BIT (OR LARGER) UNSIGNED INTEGER
            TBITS   - 8 BITS (OR MORE) FOR BIT MANIPULATION
            TBOOL   - 8 BIT (OR LARGER) LOGICAL (ZERO / NON-ZERO
                        ONLY)

            METACHAR - 16 BIT (OR LARGER) AUGMENTED CHARACTER
                        (SIGNED)

            VOID   - FUNCTION THAT RETURNS NO VALUE

            FORTRAN   - STORAGE CLASS FOR FOREIGN (NON-C) ROUTINES
                        OR C ROUTINES
                        WHICH ARE CALLABLE FROM FOREIGN ROUTINES

        SINCE NOT ALL COMPILERS SUPPORT USHORT, TINY, AND UTINY,
                        THE FUNCTIONS

USHORT( ), TINY( ), AND UTINY( ) SHOULD BE USED WHENEVER
REFERENCING THEM.

IN ADDITION, THE FOLLOWING UTILITY MACROS ARE DEFINED:
    LURSHIFT(N, B) - UNSIGNED LONG RIGHT SHIFT
    MAX(A, B)   - MAXIMUM OF A AND B
    MIN(A, B)   - MINIMUM OF A AND B

VIRTUAL TERMINAL Include File Description

```
        ABS(A)          - ABSOLUTE VALUE OF A
        STRASN(A, B)    - TRANSPORTABLE A = B FOR STRUCTURES
        NULL            - NULL POINTER VALUE (O)
        TRUE            - 1
        FALSE           - O
        SUCCESS         - EXIT(SUCCESS) INDICATES SUCCESSFUL
                    COMPLETION
        FAILURE         - EXIT(FAILURE) INDICATES ERRORS

    THE FOLLOWING SYMBOLS SHOULD BE DEFINED BASED ON THE
                    COMPILER BEING USED:
        USHORT   - COMPILER SUPPORTS UNSIGNED SHORT
        TINY     - COMPILER TREATS CHAR AS SIGNED
        UTINY    - CHAR IS SIGNED AND COMPILER SUPPORTS
                    UNSIGNED CHAR
        VOID     - COMPILER SUPPORTS VOID
        FORTRAN  - COMPILER SUPPORTS FORTRAN
        STRASN   - DEFINE APPROPRIATE MACRO
        SUCCESS  - DEFINE APPROPRIATE VALUE IF NOT O
        FAILURE  - DEFINE APPROPRIATE VALUE IF NOT 1
```

VIRTUAL TERMINAL Include File Description

FILE NAME: TERMIO
PURPOSE: TRANSPARENT TERMINAL I/O DEFINITIONS
LANGUAGE: C

DESCRIPTION:

VIRTUAL TERMINAL Include File Description

FILE NAME: TRMRTN
PURPOSE: TERMINAL (DEVICE DRIVER) ROUTINES
LANGUAGE: C

DESCRIPTION:

  DESCRIPTION
      DECLARATIONS FOR ALL TRM* DEVICE SPECIFIC DEVICE DRIVER
                        ROUTINES.

3.10.10 Hierarchy Chart

The following hierarchy charts show the relationships
between all of the modules mentioned in the above documentation.
A module may call a subroutine several times within its code,
but the call will only be shown once as a single relationship on
this hierarchy chart. All modules shown at the top of the first
page are considered Main Programs as described in section 3.10.1
above.

There is an internal paging scheme as marked by the numbers
in the upper right corner of each page. An index after the last
page of the chart shows where a routine and its calls are first
defined. If a routine has no page reference, it either makes no
calls or is an external routine. A continuation box on the end
of a tree limb shows where that the tree continues on the page
numbered mentioned. A number in a box with a routine name
points to the page where the routine is further defined within
the hierarchy tree. If there is no number in a box, the routine
either makes no calls or is an external routine.

1

```
                    +-----------+
                    |DRIVER/MAIN|
                    +-----+-----+
                          |
   +-----------+----------+---+------+----------+--------+
   |           |              |      |          |        |
+--+---+    +--+---+    +--+---+   +--+---+   +--+--+  +--+---+
|BLDCMD|    |TVTPRC|    |INITEX|   |MEMCMP|   |PUTVT|  |(CONT)|
+------+    +--+---+    +------+   +------+   +----2+  +-----3+
              |
        +---------+-------+
        |         |       |
     +--+---+  +--+--+  +-+--+
     |TRMNAT|  |TRMVT|  |EXIT|
     +------+  +---10+  +----+
```

3-153

```
                                   + - - - - +
                                   | PUTVT |
                                   + - - + - - +
                                        |
       + - - - - - - - - - + - - - - - - - - - + - - + - - + - - - - - - - - + - - - - - - - +
       |                   |                   |             |                |             |
  + - - + - - - +     + - - + - - - +     + - - - + - - - +   + - + - - +    + - - + - - - +   + - - + - - - +
  | BLDCMD |     | FNDWND |     | PRCCMDS |   | TBIT |    | TRMFLS |   | (CONT) |
  + - - - - - - +     + - - + - - - +     + - - - - - 27+   + - - - - +    + - - + - - - +   + - - - - - 4+
                         |                                              |
                         |                              + - - - - - + - - - - - - +
                         |                              |                   |
                    + - - + - - - +                 + - - - - - + - - - - - - +   + - - + - - - +
                    | FNDWND |                 | VT100 / MOVCUR |   | TFLUSH |
                    + - - - - - 2+                 + - - - - - - + - - - - - - +   + - - - - - - +
                                                                |
                               + - - - - - - - - - + - - - - - - - - - + - - + - - - - - - - - + - - - - - - - +
                               |                   |                   |             |             |
                          + - - + - - - +     + - - - + - - - +     + - - + - - +   + - + - +   + - + - +
                          | TPUTC |     | TPUTNUM |     | TPUTS |   | COL |   | ROW |
                          + - - - - - +     + - - - - - 29+     + - - - 10+   + - - - +   + - - - +
```

3

```
                      +-------------+
                      |DRIVER/MAIN |
                      +-----+------+
                            |
    +---------+--------+----+-----+----------+-------------+
    |         |        |          |          |             |
+---+---+  +--+----+  +--+---+  +--+---+   +-+--+    +--+----+
|(CONT) |  |FPRINTF|  |PRINTF|  |TRMNAT|   |EXIT|    |(CONT) |
+-----1 +  +-------+  +------+  +------+   +----+    +----5  +
```

4

```
                            +-----+
                            |PUTVT|
                            +--+--+
                               |
       +-----------------------+----+-----------+----------+
       |          |            |         |           |          |
  +--+---+   +--+---+    +--+---+   +--+---+   +--+---+   +--+---+
  |(CONT)|   |RMVWND|    |DEFWND|   |SWNPRC|   |DEFFLD|   |(CONT)|
  +-----2+   +--+---+    +-----6+   +--+---+   +-----7+   +-----8+
                |                      |
        +-------------+--------+       |
        |         |            |       |
   +--+---+  +--+---+    +-+--+   +--+---+
   |FNDWND|  |ERAWND|    |FREE|   |STFMTF|
   +-----2+  +-----8+    +----+   +-----6+
```

5

```
                      +------------+
                      |DRIVER/MAIN |
                      +-----+------+
                            |
      +---------+---------+----+----+---------+---------+
      |         |         |         |         |         |
  +--+---+  +--+--+  +--+---+  +--+---+  +--+--+  +--+---+
  |(CONT)|  |INTVT|  |CALLOC|  |MALLOC|  |FATAL|  |(CONT)|
  +-----3+  +----9+  +------+  +------+  +--+--+  +----10+
                                           |
                                    +----+----+
                                    |         |
                               +--+---+  +--+---+
                               |TVTPRC|  |PRINTF|
                               +-----1+  +------+
```

6

```
                            +------+
                            |DEFWND|
                            +--+---+
                               |
      +---------+-------+-+------+-------+
      |         |       |        |       |
  +--+---+  +--+---+  +-+-+   +-+-+  +--+---+
  |FNDWND|  |CALLOC|  |MAX|   |MIN|  |STFMTF|
  +-----2+  +------+  +---+   +---+  +--+---+
                                        |
                                        |
                                        |
                                    +--+---+
                                    |STFMTF|
                                    +-----6+
```
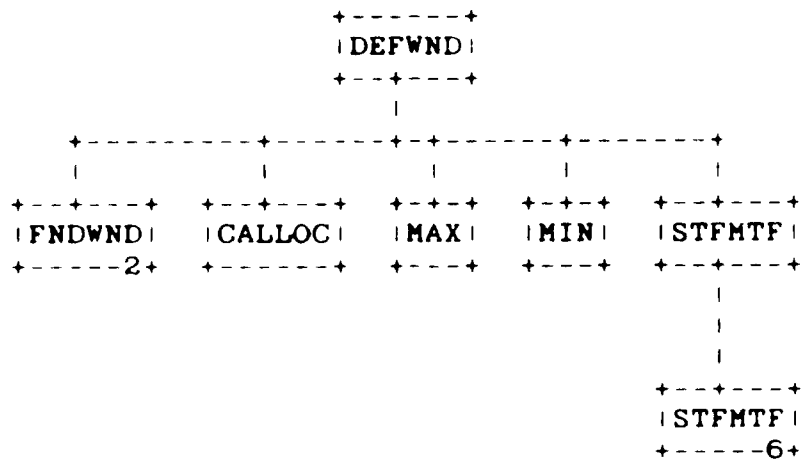
7

```
                        + - - - - - +
                        |DEFFLD|
                        + - - + - - - +
                            |
        + - - - - - - - - - + - - - + - - - + - - - - - - - - - +
        |                   |           |                       |
    + - - + - - - +     + - - + - - - +   + - - + - - - +     + - - - + - - - +
    |CALLOC|     |MALLOC|   |MEMSET|     |ISPRINT|
    + - - - - - +     + - - - - - +   + - - - - - +     + - - - - - +
```

8

```
                              +-----+
                              |PUTVT|
                              +--+--+
                                 |
     +----------+----------+----+----+---------+----------+
     |          |          |         |         |          |
 +--+---+   +--+---+   +--+---+   +--+---+   +--+---+   +--+---+
 |(CONT)|   |BVTIDS|   |ERAWND|   |PCHVTI|   |CLRMOD|   |(CONT)|
 +----4+    +----11+   +--+---+   +----12+   +--+---+   +----13+
                          |                     |
                     +--+----+                  |
                     |       |                  |
                 +--+---+ +-+--+            +-+--+
                 |ERAWND| |FREE|            |CBIT|
                 +----8+  +----+            +----+
```

9

```
                        +-----+
                        |INTVT|
                        +--+--+
                           |
      +---------+--------+---------+---------+
      |         |        |         |         |
   +--+--+  +--+---+  +-+-+--+  +--+--+  +--+---+
   |CSTR |  |MALLOC|  |FREE |  |PUTVT|  |TRMINI|
   +-----+  +------+  +-----+  +----2+  +--+---+
                                           |
                                  +----+----+
                                  |         |
                              +--+---+  +--+---+
                              |TBOPEN|  |PRNINI|
                              +------+  +------+
```

10

```
                           +------------+
                           | DRIVER/MAIN|
                           +-----+------+
                                 |
         +----------+-----------+----+--+---------+---------+
         |          |           |       |         |         |
     +--+---+   +--+---+   +--+---+   +-+-+   +--+---+   +--+---+
     |(CONT)|   | DELAY|   | TRMVT|   | RCV|   | TRMCHK|   |(CONT)|
     +-----5+   +------+   +--+---+   +---+   +--+---+   +----14+
                              |                  |
                  +-----------+--------+         |
                  |           |        |         |
              +--+---+   +--+---+   +--+--+   +--+---+
              | TRMEND|   | FREE|   | PUTVT|   | TCHECK|
              +--+---+   +-----+   +----2+   +-------+
                 |
        +--------+--+--------+
        |           |        |
    +--+---+   +--+-+   +--+---+
    | PRNEND|   | TPUTS|   | TCLOSE|
    +------+   +--+---+   +-------+
                  |
                  |
                  |
              +--+--+
              | TPUTC|
              +-----+
```
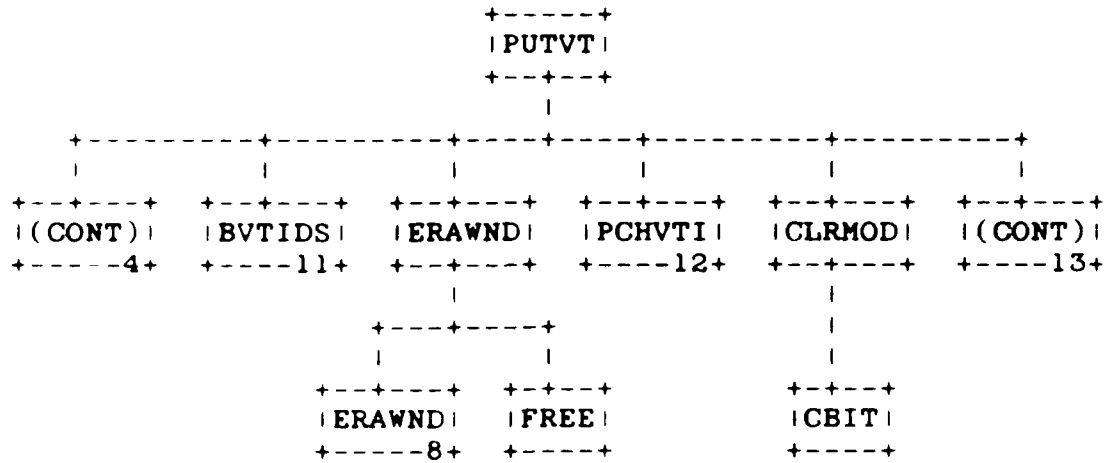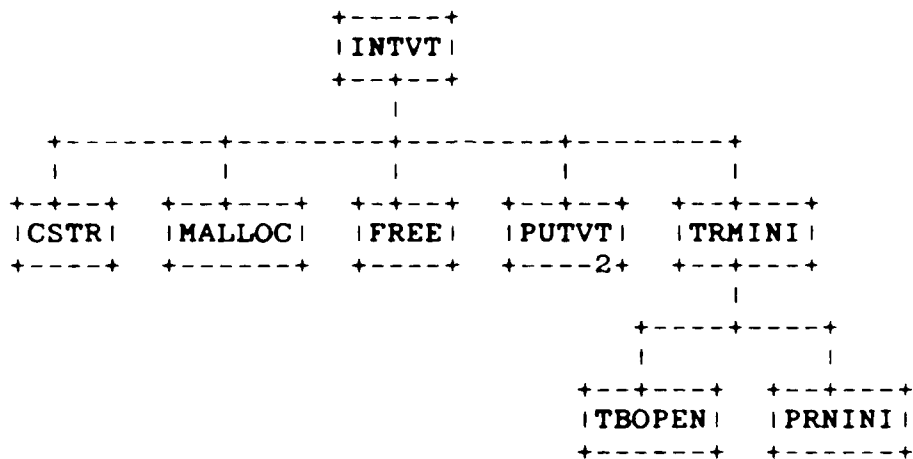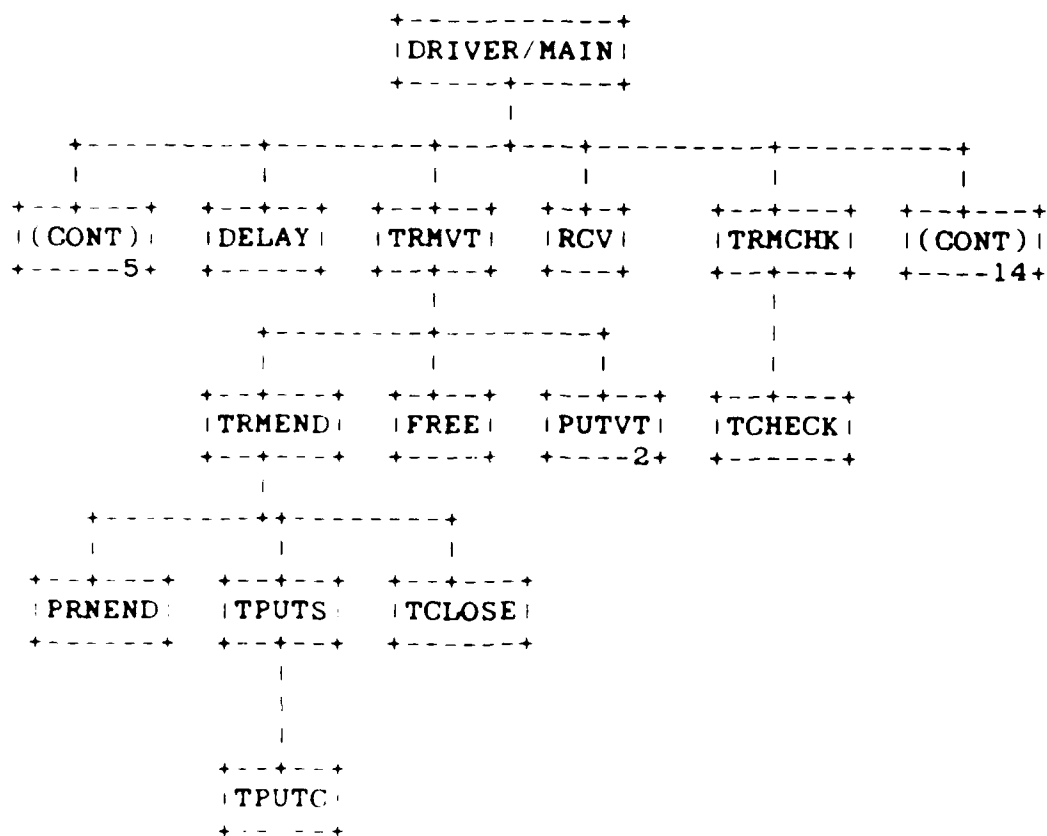
11

```
                              +------+
                              |BVTIDS|
                              +--+---+
                                 |
        +----------+----------+--+----------+-------+
        |          |             |          |       |
   +--+---+    +---+---+    +------+------+  +-+-+  +--+---+
   |BLDCMD|    |PRCCMDS|    |BVTIDS/CLRFLG|  |ROW|  |(CONT)|
   +------+    +-----27+    +------+------+  +---+  +----15+
                                 |
                                 |
                                 |
                          +------+------+
                          |BVTIDS/CLRFLG|
                          +-----------11+
```

12

```
                    +------+
                    |PCHVTI|
                    +--+---+
                       |
          +--------+--------+
          |        |        |
        +-+--+   +--+---+   +-+-+
        |TBIT|   |ABSPOS|   |MAX|
        +----+   +------+   +---+
```

13

```
                              +-----+
                              |PUTVT|
                              +--+--+
                                 |
         +---------+---+---------------+
         |             |               |
     +--+---+     +---+---+        +--+---+
     |(CONT)|     |GVTICMD|        |STRDPN|
     +-----8+     +---+---+        +--+---+
                      |               |
                 +----+-----+         |
                 |          |         |
            +---+---+   +---+---+   +------+------+
            |ISPRINT|   |ISDIGIT|   |STRDPN/STFDRD|
            +-------+   +-------+   +------+------+
                                           |
                                           |
                                           |
                                    +------+------+
                                    |STRDPN/STFDRD|
                                    +----------13+
```
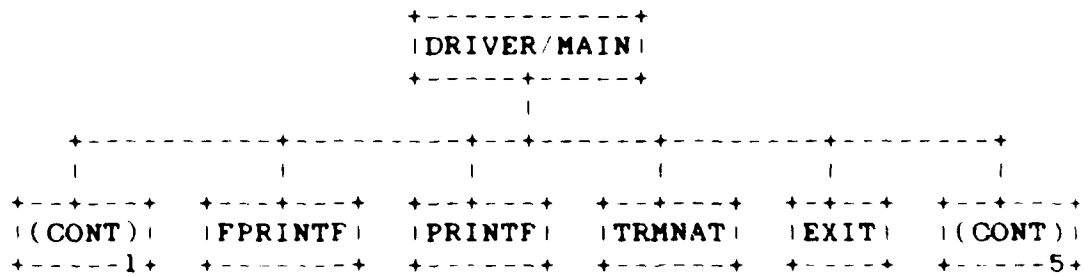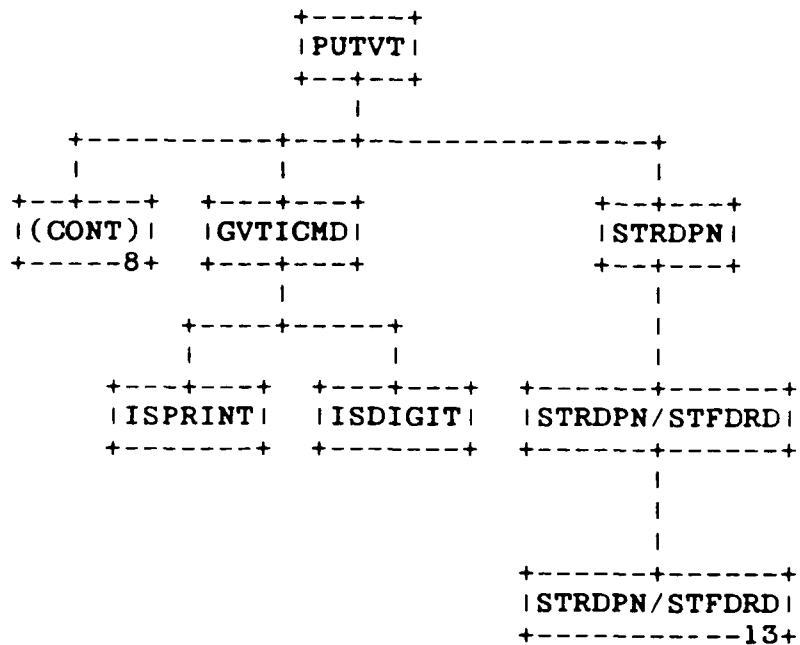
3-165

14

```
                          +----------+
                          |DRIVER/MAIN|
                          +-----+-----+
                                |
        +---------+---------+----+----+---------+---------+
        |         |         |         |         |         |
     +--+---+  +--+--+  +--+---+  +--+---+  +--+---+  +--+---+
     |(CONT)|  |GETVT|  |SIGNAL|  |MEMCPY|  |STRCPY|  |(CONT)|
     +----10+  +---16+  +------+  +------+  +------+  +----17+
```

15

```
                              +------+
                              |BVTIDS|
                              +--+---+
                                 |
     +---------+--------+----+---+-------+----------+
     |         |        |        |       |          |
  +--+---+  +-+-+  +--+---+  +-+-+  +--+---+  +--+---+
  |(CONT)|  |COL|  |ABSPOS|  |MAX|  |STRASN|  |(CONT)|
  +----11+  +---+  +------+  +---+  +------+  +----18+
```

16

```
                          +-----+
                          |GETVT|
                          +--+--+
                             |
        +---------+---------+----+----+---------+---------+
        |         |         |         |         |         |
    +---+---+  +--+---+  +-+--+  +---+---+  +--+---+  +--+---+
    |BLDCMD |  |CLRMOD|  |TBIT|  |PVTICMD|  |TRMGET|  |(CONT)|
    +-------+  +----8+  +----+  +---+---+  +----19+  +----20+
                                    |
                                    |
                                    |
                          +-------+-------+
                          |PVTICMD/PUTNUM |
                          +---------------+
```
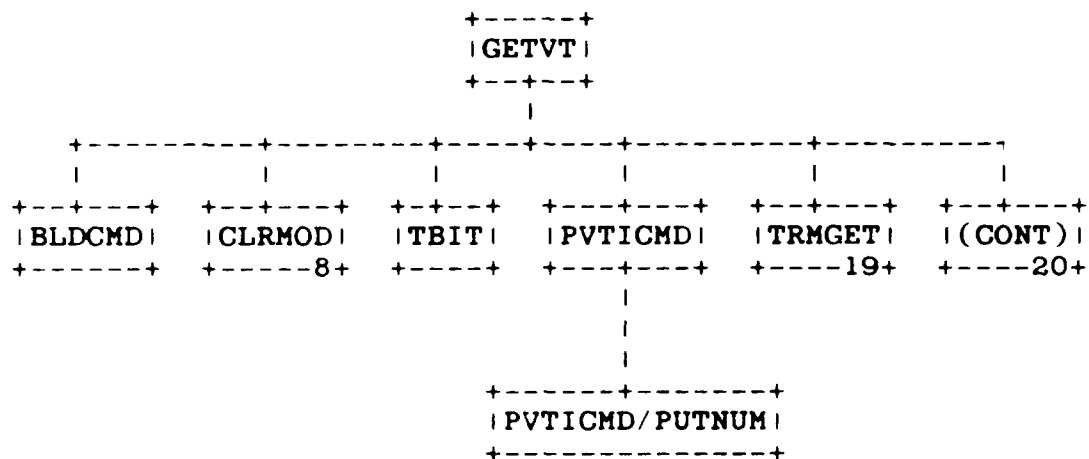
17

```
                        +-----------+
                        |DRIVER/MAIN|
                        +-----+-----+
                              |
      +----------+-----------+-----+----+----------+---------+
      |          |           |          |          |         |
  +--+---+   +-+--+   +--+---+   +---+---+   +--+---+   +--+---+
  |(CONT)|   |FREE|   |STRCAT|   |SPRINTF|   |STRLEN|   |(CONT)|
  +----14+   +----+   +------+   +-------+   +------+   +----21+
```

3-169

18

```
                              +-------+
                              |BVTIDS|
                              +--+---+
                                 |
              +------------+-+-----------+
              |            |             |
         +--+---+     +--+---+     +------+------+
         |(CONT)|     |MEMCMP|     |BVTIDS/RVTIFM|
         +----15+     +------+     +------+------+
                                          |
                              +-------+---------+
                              |                 |
                      +-------+------+   +------+------+
                      |BVTIDS/BVTIFM |   |BVTIDS/CVTIFM|
                      +-----------22+   +------+------+
                                               |
                                   +--------++--------+
                                   |        |         |
                               +--+---+ +--+---+ +-+--+
                               |STRASN| |MALLOC| |FREE|
                               +------+ +------+ +----+
```

3-170
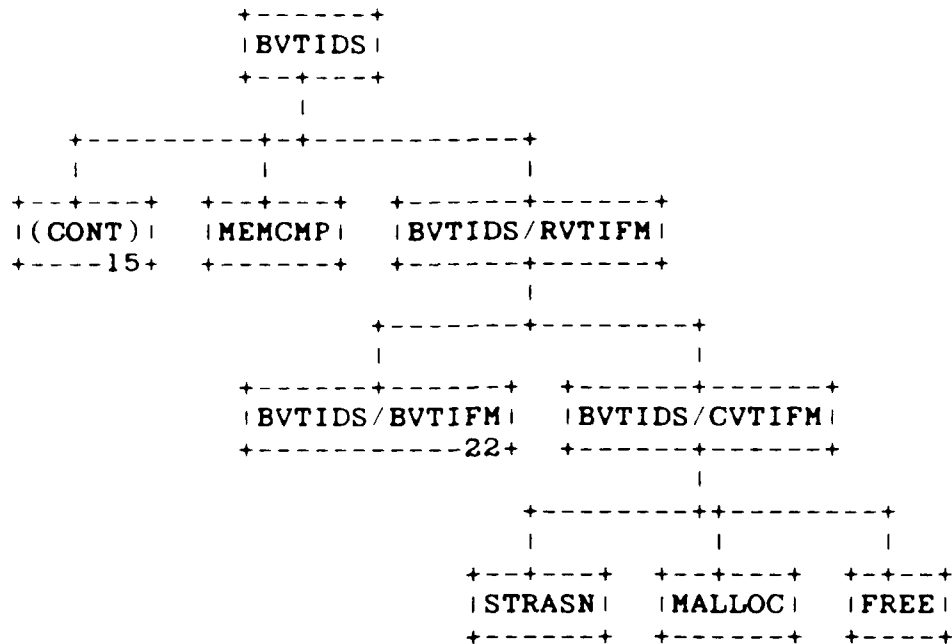
```
                              +------+
                              |TRMGET|
                              +--+---+
                                 |
         +-----------+----------++----------+----------+
         |           |           |          |          |
     +--+----+   +--+---+   +---+---+   +--+---+   +--+---+
     |BLDCMD|    |PRINTF|   |GETCHAR|   |TPURGE|   |(CONT)|
     +------+    +------+   +-------+   +------+   +----23+
```

```
                        +------+
                        |GETVT |
                        +--+---+
                           |
        +------------+------------+
        |            |            |
    +--+---+     +--+---+     +--+---+
    |(CONT)|     |PCHVTI|     |BLDMSG|
    +----16+     +----12+     +--+---+
                                 |
        +-------+-------------+------------+---------+
        |       |             |            |         |
    +-+-+   +-+-+     +-------+------+  +---+---+  +--+---+
    |ROW|   |COL|     |BLDMSG/BLDBUF|  |SPRINTF|  |(CONT)|
    +---+   +---+     +------+-------+  +-------+  +----24+
                            |
        +-----------+---+------+---------+
        |           |          |         |
    +------+-----+  +-+---+  +-+---+  +---+---+
    |BLDMSG/BLDBUF|  |MEMCPY| |STRLEN|  |SPRINTF|
    +----------20+  +------+  +------+  +-------+
```

3 172

21

```
                            +-----------+
                            |DRIVER/MAIN|
                            +-----+-----+
                                  |
       +---------+---------+------+------+------+--------+
       |         |         |      |      |      |        |
   +--+---+  +--+--+   +--+---+  +-+-+  +-+--+  +--+---+
   |(CONT)|  |NSEND|   |FWRITE|  |MIN|  |PUTC|  |(CONT)|
   +----17+  +-----+   +------+  +---+  +----+  +----25+
```

22

```
                    +--------------+
                    |BVTIDS/BVTIFM |
                    +------+-------+
                           |
             +-------------+-+------------+
             |               |            |
     +-------+------+   +------+------+  +--+---+
     |BVTIDS/BVTIFM |   |BVTIDS/INSFLD|  |MALLOC|
     +----------22+     +------+------+  +------+
                               |
          +---------------+----+---------+------+
          |               |          |         |
      +--+---+        +--+---+    +-+--+    +-+-+    +-+-+
      |STRASN|        |MALLOC|    |FREE|    |MIN|    |MAX|
      +------+        +------+    +----+    +---+    +---+
```

```
                            +------+
                            |TRMGET|
                            +--+---+
                               |
      +----------+---------+---+------+----------+--------+
      |          |         |          |          |        |
   +--+---+  +---+---+  +--+--+  +---+----+  +-+-+  +--+---+
   |(CONT)|  |ISPRINT|  |TGETC|  |DOSCREEN|  |ROW|  |(CONT)|
   +----19+  +-------+  +-----+  +------28+  +---+  +----26+
```

24

```
                        +------+
                        |BLDMSG|
                        +--+---+
                           |
       +---------+---------+--+--------+-----------+
       |         |         |           |           |
    +--+---+  +--+---+  +--+---+  +------+------+  +--+---+
    |(CONT)|  |STRLEN|  |MEMCPY|  |BLDMSG/REDOFF|  |BVTIDS|
    +----20+  +------+  +------+  +------+------+  +----11+
                                        |
                                        |
                                        |
                                +------+------+
                                |BLDMSG/REDOFF|
                                +-----------24+
```
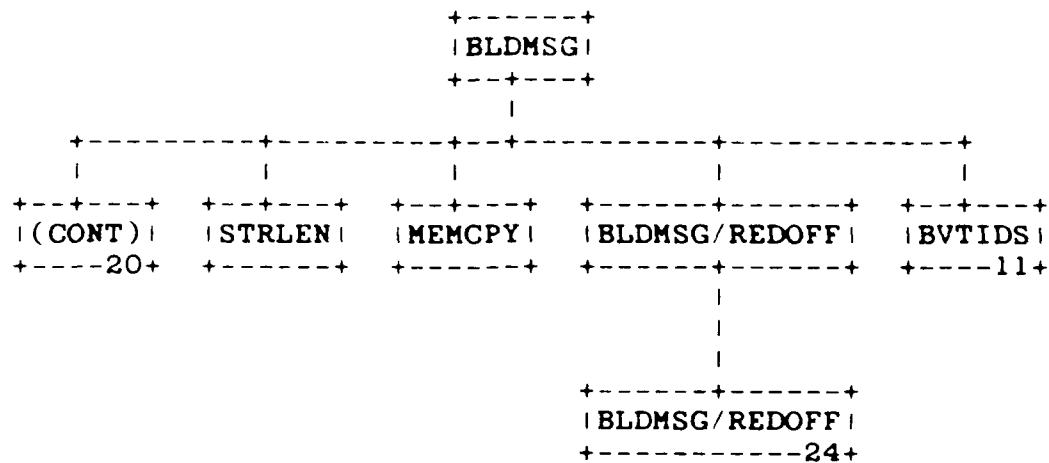
25

```
                         +-----------+
                         |DRIVER/MAIN|
                         +-----+-----+
                               |
      +----------+-----------+----+----+---------+-----------+
      |          |           |         |         |           |
   +--+---+   +--+---+   +---+---+   +--+--+   +---+---+   +---+---+
   |(CONT)|   |FCLOSE|   |FSEARCH|   |FOPEN|   |PRCCMDS|   |TOLOWER|
   +----21+   +------+   +-------+   +-----+   +-----27+   +-------+
```

END
8-87
DTIC
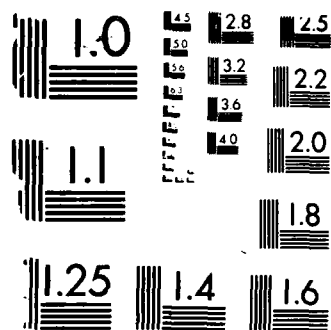
26

```
                         +------+
                         |TRMGET|
                         +--+---+
                            |
    +--------+-------+-----+---+--------+---------+
    |        |       |         |        |         |
+--+---+  +-+-+  +--+---+  +--+---+  +-+--+  +---+---+
|(CONT)|  |COL|  |TRMPUT|  |TRMFLS|  |TBIT|  |ISDIGIT|
+----23+  +---+  +----27+  +-----2+  +----+  +-------+
```

27

```
                              +-------+
                              |PRCCMDS|
                              +---+---+
                                  |
      +----------+----------+-----+----+--------+------+
      |          |          |          |        |      |
   +--+---+  +---+----+  +---+---+  +-+--+  +-+-+  +-+-+
   |BLDCMD|  |DOSCREEN|  |TRMPUT |  |TBIT|  |ROW|  |COL|
   +------+  +------28+  +--+----+  +----+  +---+  +---+
                            |
         +---------+--------+--------+---------+
         |         |        |        |         |
      +--+---+  +--+---+  +--+---+  +--+---+  +--+---+
      |GETCHAR|  |PRINTF|  |PRNFLS|  |PRNPUT|  |(CONT)|
      +-------+  +------+  +------+  +------+  +----29+
```

28

```
                       +---------+
                       |DOSCREEN |
                       +---+-----+
                           |
    +--------+---------+------+----+----------+--------+
    |        |         |      |         |     |        |
+-+--+   +-+--+    +-+--+  +----+-----+  +-+-+  +--+---+
|TBIT|   |CBIT|    |FFBSA| |DOSCR/HSCR|  |COL|  |(CONT)|
+----+   +----+    +-----+ +----+-----+  +---+  +----30+
                                |
                    +----------++-----+------+
                    |           |      |      |
              +-----+-----+  +-+-+  +-+-+  +-+--+
              |DOSCR/ERASE|  |MIN|  |COL|  |TBIT|
              +---------34+  +---+  +---+  +----+
```

29

```
                                +------+
                                |TRMPUT|
                                +--+---+
                                   |
        +----------+----------+----+-----+--------+--------+
        |          |          |          |        |        |
     +--+---+   +--+---+   +---+---+   +-+-+   +--+--+   +--+---+
     |(CONT)|   |REFTERM|  |TPUTNUM|   |POS|   |TPUTS|   |(CONT)|
     +----27+   +-----31+  +---+---+   +---+   +---10+   +----32+
                               |
                               |
                           +--+--+
                           |TPUTC|
                           +-----+
```
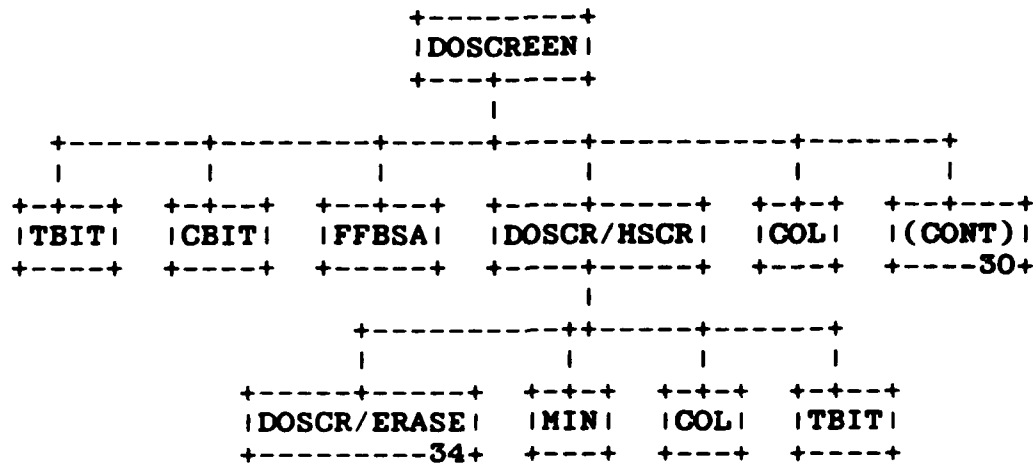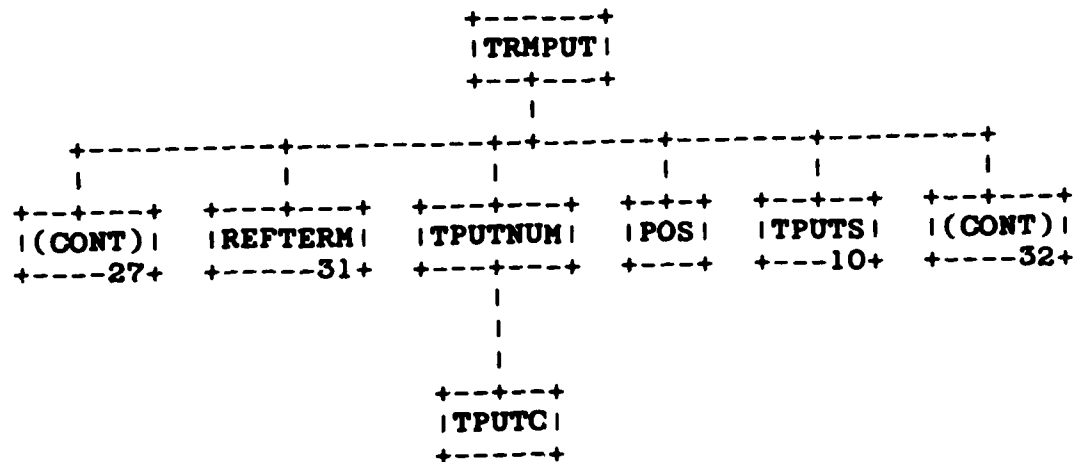
30

```
                            +--------+
                            |DOSCREEN|
                            +---+----+
                                |
        +----------+--------+-----+-+--------+----------+
        |          |        |       |        |          |
    +--+---+   +-+-+   +--+--+   +-+-+   +----+----+   +-+-+---+
    |(CONT)|   |MAX|   |FFBSB|   |ROW|   |DOSCR/VSCR|   |(CONT)|
    +----28+   +---+   +-----+   +---+   +--------33+   +----34+
```

31

```
                            +-------+
                            |REFTERM|
                            +---+---+
                                |
        +----------+--------+----+---+--------+----------+
        |          |        |        |        |          |
    +--+---+    +-+--+   +--+---+  +-+--+  +---+---+   +--+---+
    |BLDCMD|    |TBIT|   |TRMPUT|  |SBIT|  |SLINEND|   |(CONT)|
    +------+    +----+   +----27+  +----+  +---+---+   +----35+
                                               |
                                         +---+---+
                                         |       |
                                     +--+--+   +-+-+
                                     |INVIS|   |COL|
                                     +---36+   +---+
```

32

```
                          +------+
                          |TRMPUT|
                          +--+---+
                             |
      +----------+--------+--+---+-------+--------+
      |          |        |      |       |        |
  +--+---+   +---+---+  +-+-+  +-+-+  +--+--+  +--+---+
  |(CONT)|   |REFRESH|  |ROW|  |COL|  |TPUTC|  |(CONT)|
  +----29+   +-----36+  +---+  +---+  +-----+  +----37+
```

33

```
                        +-----------+
                        |DOSCR/VSCR |
                        +----+------+
                             |
     +--------+---------+------+---+------+-------+-------+
     |        |         |          |      |       |       |
   +-+--+   +-+-+   +-----+-----+  +-+-+  +-+-+   +-+-+  +--+---+
   |SBIT|   |MAX|   |DOSCR/ERASE|  |ROW|  |MIN|   |COL|  |(CONT)|
   +----+   +---+   +---------34+  +---+  +---+   +---+  +----38+
```

34

```
                              +--------+
                              |DOSCREEN|
                              +---+----+
                                  |
        +--------------+---------++-------+-------+-------+
        |              |          |       |       |       |
   +--+---+     +-----+-----+  +-+-+  +--+--+  +-+-+  +--+---+
   |(CONT)|     |DOSCR/ERASE|  |FIX|  |LIMIT|  |POS|  |(CONT)|
   +----30+     +-----+-----+  +---+  +-----+  +---+  +----39+
                      |
        +--------+-------++------+--------+
        |        |        |      |        |
   +-+--+   +-+-+   +-+--+   +-+--+   +--+---+
   |SBIT|   |COL|   |TBIT|   |CBIT|   |STRASN|
   +----+   +---+   +----+   +----+   +------+
```
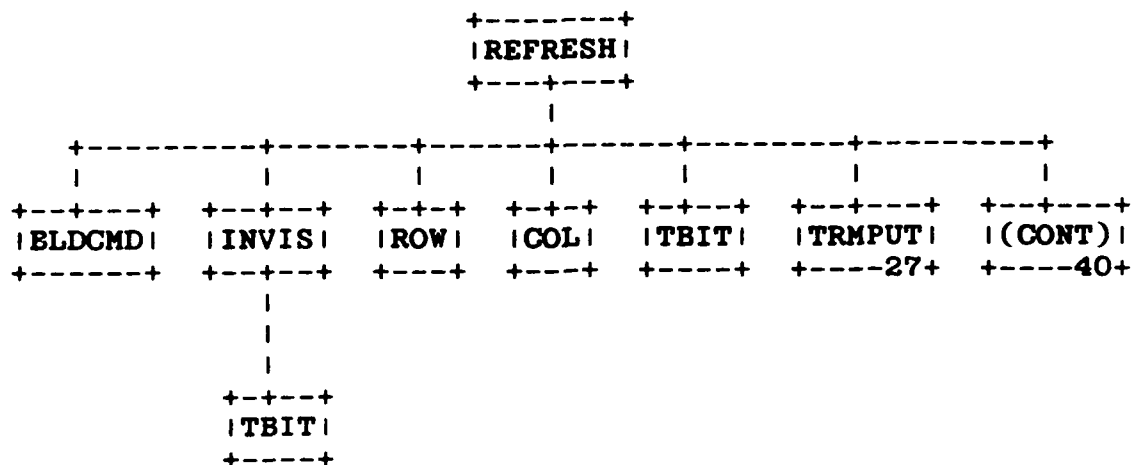
35

```
                      +-------+
                      |REFTERM|
                      +---+---+
                          |
      +---------+-------+-+----+------+------+
      |         |       |      |      |      |
   +--+---+  +-+--+  +-+-+  +-+-+  +-+-+  +-+-+
   |(CONT)|  |CBIT|  |COL|  |ROW|  |MAX|  |MIN|
   +----31+  +----+  +---+  +---+  +---+  +---+
```

36

```
                              +-------+
                              |REFRESH|
                              +---+---+
                                  |
    +----------+--------+------+------+--------+---------+
    |          |        |      |      |        |         |
+---+---+  +---+---+  +-+-+  +-+-+  +-+--+  +--+---+  +--+---+
|BLDCMD |  |INVIS  |  |ROW|  |COL|  |TBIT|  |TRMPUT|  |(CONT)|
+-------+  +---+---+  +---+  +---+  +----+  +----27+  +----40+
               |
               |
               |
           +-+--+
           |TBIT|
           +----+
```

37

```
                          +------+
                          |TRMPUT|
                          +--+---+
                             |
       +--------------+------+----+--------+---------+
       |              |           |        |         |
    +--+---+     +-----+------+ +-+--+  +--+-+  +--+---+
    |(CONT)|     |VT100/SETATR| |SBIT|  |FFBSA|  |(CONT)|
    +----32+     +-----+------+ +----+  +-----+  +----41+
                       |
          +---------+--+----+--------+
          |         |       |        |
       +---+---+ +--+--+  +--+--+  +--+--+
       |TPUTNUM| |TPUTC|  |FFBSA|  |TPUTS|
       +-----29+ +-----+  +-----+  +---10+
```
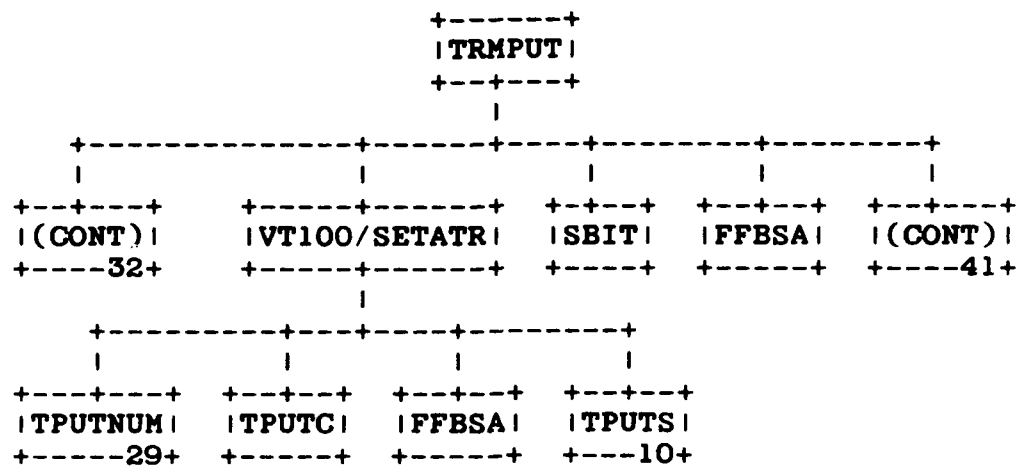
38

```
          +----------+
          |DOSCR/VSCR|
          +----+-----+
               |
      +--------++-------+
      |         |        |
  +--+---+   +-+--+   +-+--+
  |(CONT)|   |CBIT|   |TBIT|
  +----33+   +----+   +----+
```

```
                              +--------+
                              |DOSCREEN|
                              +--+-----+
                                 |
          +----------+--------+-+--------+--------+
          |          |        |          |        |
      +--+---+    +--+--+   +--+--+   +-+--+   +-+--+
      |(CONT)|    |CABIT|   |FLOOR|   |SBIT|   |ZERO|
      +----34+    +-----+   +-----+   +----+   +----+
```

40

```
                      +-------+
                      |REFRESH|
                      +---+---+
                          |
        +-----------+---+----+---------+
        |           |        |         |
    +--+---+     +-+--+   +--+---+   +-+--+
    |(CONT)|     |SBIT|   |TRMFLS|   |CBIT|
    +----36+     +----+   +-----2+   +----+
```

41

```
                            +------+
                            |TRMPUT|
                            +--+---+
                               |
        +----------+--------+--+--------+-----------+
        |          |        |           |           |
     +--+---+   +--+--+   +--+--+   +----+-------+  +-+--+
     |(CONT)|   |CABIT|   |FFBDA|   |VT100/MOVCUR|  |TBIT|
     +----37+   +-----+   +-----+   +-----------2+  +----+
```

3.11 Program Listings Comments

This information is contained in the Module Descriptions in section 3.10.

SECTION 4

QUALITY ASSURANCE PROVISIONS

4.1   Introduction and Definitions

"Testing" is a systematic process that may be preplanned
and explicitly stated. Test techniques and procedures may be
defined in advance, and a sequence of test steps may be
specified. "Debugging" is the process of isolation and
correction of the cause of an error.

"Antibugging" is defined as the philosophy of writing
programs in such a way as to make bugs less likely to occur and
when they do occur, to make them more noticeable to the
programmer and the user. In other words, as much error checking
as is practical and possible in each routine should be
performed.

4.2   Computer Programming Test and Evaluation

The quality assurance provisions for test consists of the
normal testing techniques that are accomplished during the
construction process. They consist of design and code
walk-throughs, unit testing, and integration testing. These
tests are performed by the design team. Structured design,
design walk-through and the incorporation of "antibugging"
facilitate this testing by exposing and addressing problem areas
before they become coded "bugs."

END

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DTIC